The Thoresby Society

THE PUBLICATIONS OF THE THORESBY SOCIETY

ESTABLISHED IN THE YEAR
MDCCCLXXXIX

VOLUME XLVIII

KIRKSTALL ABBEY EXCAVATIONS
1955-1959

LEEDS:
THE THORESBY SOCIETY
16 QUEEN SQUARE
1961

CONTENTS

ILLUSTRATIONS

PLATES

ILLUSTRATIONS

PLANS AND FIGURES

ILLUSTRATIONS

PLANS AND FIGURES

ERRATA

p.64, line 29, read "p.56."

p.64, last line, for "Repart" read "Report."

p.80, line 24, for "plate IX" read "plate X."

Kirkstall Abbey Excavations

1955-1959

PREFACE

FOLLOWING the success of the excavations carried out between the years 1950/54 by members of the staff of the Leeds City Museums assisted by volunteers, it is with some pride and satisfaction that the results of a further five years' work are given in this volume.

For the years 1955/57 the work was directed by Dr. D. E. Owen and Mr. C. Vincent Bellamy and for the subsequent two years by Mr. C. Vincent Bellamy and Mr. C. M. Mitchell.

At the end of his preface to the first five years' report, Dr. Owen suggested that there would be many more years of excavation before the task of thoroughly exploring the Abbey could be said to be complete. This suggestion has been more than justified by the results of the last five years' work, which although it has revealed hitherto unsuspected structures, has at the same time posed problems which can only be solved by further excavation.

It should be stressed that any theories proposed as a result of a season's dig must, of necessity, be only tentative ones. This applies equally to the series as a whole, for factors can and do arise that may alter or demolish any ideas based on what was known at the time that they were propounded.

THE EXCAVATIONS

The sixth season's dig had two main objectives; first, to explore further the refectory and to plan and re-lay part of its tiled floor found in 1953, and secondly, to re-build the monastic 'bath' discovered in 1951.

The result of the work in the refectory gave evidence of bonfires before the building of the frater. The second refectory was shown to be of twelfth century construction, as suggested by St. John Hope. Subsequent floor levels were dated to the thirteenth and fifteenth centuries; the latter being the one laid out with patterned tiles.

A section of these tiles was re-laid and left exposed, but unfortunately, the tiles have now weathered so much that the pattern has almost disappeared and they will have to be covered up again.

The monastic 'bath' was again excavated and its walls and steps re-built. A small drain running out of the bottom of the south wall was discovered. This was subsequently traced southwards and was found to run underneath the main drain, then across the meat-kitchen and was subsequently found farther

south in the 1958 dig. The evidence for calling the stone structure a 'bath' has been very carefully re-examined and whilst it may have served such a purpose, there is no proof that this was the case. It is known that monasteries did have baths, but it must not be assumed from this that the stone chamber at Kirkstall is one. It could equally have been used as a cistern, or a steeping vat. Perhaps the best conclusion that can be reached is one of not proven.

The seventh year of digging was carried on in the Abbot's house and in the meat-kitchen. Investigation of the Abbot's house yielded little information which was not already known. As with all archaeological work, however, it was not a waste of time, as it is just as important to get a negative as a positive result.

The exploration of the meat-kitchen, however, had far-reaching results as it led to the systematic digging of the area south of the walls. First, a floor of rectangular stone sets was exposed and a large hearth revealed. The 'bath' drain was found underneath this floor and ran below the south wall of the kitchen.

Exploration of the area beyond this wall revealed an annexe containing two further rooms. The south wall of this annexe was heavily buttressed at each corner. Outside its west wall the remains of a large circular building were found. The exact purpose of this could not be ascertained, but it has been suggested that it was a pigeon-cote. Positive proof of this theory is lacking.

A dump of animal bones found against the west wall of the meat-kitchen was investigated by Dr. Michael Ryder. This led to further investigations of animal bones in 1957 and 1958. The results of this work showed that amongst the animals used as food were oxen, sheep, deer, pig, rabbit, hare, ducks, geese, pigeons, widgeons, fish, oysters and mussels.

In the eighth year, the meat-kitchen annexe was explored still further and its outline delineated. There was also a semi-exploration of the area west of the meat-kitchen walls. This partially revealed sections of the walls of the building noted by St. John Hope.

Work on the area south of the meat-kitchen walls was started, and this led to the discovery of timber revetting, and a long wall running towards the river. The finding of timber revetting gave rise to speculation on the probable course of the river in the twelfth century, and there can be no doubt from the evidence obtained that the river during this period was much closer to the Abbey than it is today.

Trial trenches were also dug in the eastern courtyard and in the cemetery. Both of these, however, proved negative.

The ninth season's dig was concerned with further excavation of the area south of the walls, and also west of the circular building. The importance of the structures found on the south side

led to the decision that the area would have to be thoroughly explored. To this end a large rectangle was measured out and the area traced on a grid. The results obtained from this area may be summarised as follows. The timber revetting was probably a jetty used for the landing of the stone for the building of the Abbey and may be mid-twelfth century in date. The stone structure in the warming house courtyard dates back to the early thirteenth century, and its drain clearly came out in the old river bank. The ground to the south of the jetty was gradually made up and the river pushed back to its present course. The long south wall discovered in 1957 was seen to go directly south towards the river and then make a sharp right-angled turn toward the east. The composition of this wall was such that it could not be the wall of a building and was no doubt the boundary wall of a kitchen garden. In the Cardigan Estate map of 1711 this area is called "Kitching garth."

The area west of the circular building revealed a paved area and drain lying between the west wall of St. John Hope's building, and a wall running south towards the river. This south wall probably served a similar purpose to the one described in the previous paragraph. Running at right-angles from this south wall was another wall going towards the west. This had the threshold of a doorway in it some twelve feet from its junction with the south wall. Just past this doorway another wall branched off towards the south-west. Investigation showed that this branch wall was probably post-monastic.

In the tenth season's dig the paved area and building noted by St. John Hope were more thoroughly explored, the west wall followed still farther, and the infirmary investigated. The building noted by St. John Hope was shown to be rectangular in shape but there was no indication as to its date. It was, however, probably monastic, as the final floor of the paved area and drain was seen to butt up against the wall of the building. Further excavation of the west wall showed it to carry on towards the lay-brothers' rere-dorter. An important find was the discovery of the capping stones of a large drain. When they were removed they revealed a drain equal in size and style of masonry to that of the main drain itself. In 1960 this new drain was found to meet the main drain. There was also a suggestion of a building, but only the remains of three of its walls were found. One of these ran along the capping stones. Further westward again a large doorway and cobbled area were revealed. The result of the exploration of the west wall shows that it was probably a curtain wall shielding the south range of buildings from the river.

Investigation of the infirmary revealed much of interest. The results supported St. John Hope on nearly every point with regard to the sequences and approximate dates of the various alterations to the buildings. The only modification of his views is

on the first building. Evidence shows that it was a very substantial one right from the beginning, and not a half-timbered structure as St. John Hope suggests.

It has not been the purpose of this preface to go more fully into the findings of the five years' work. To have done so would merely have been to re-write what has already been said. What, however, should be added is that there must be many years of digging before we can say with any certainty that we know the full plan of Kirkstall Abbey. Each year has brought to light new and important structures and it would seem that the full exploration of the south side of the abbey is far from complete. What has been rather disappointing is the absence of stratified material which would indicate the possible periods of construction of the buildings lying on the south side of the Abbey. This is no doubt due to the disturbances wrought in the past by the monks themselves when pushing back the river, by those who despoiled the buildings at the Dissolution, and by the activities of Corporation workmen when the Abbey was given to the city. It is hoped that by the end of the next five years we shall be able to say that we know what lies underneath this area. We shall then be able to turn our attention to other parts of the Abbey grounds.

C. M. Mitchell.

THE TILES

Since writing the section of the report dealing with the tiled floor in the refectory (6th Report, 1955) our attention has been drawn to the close resemblance of the circular centrepiece to circular pavements discovered on the site of Jervaulx Abbey early last century. Drawings of some of these were published by Henry Shaw in *Specimens of Tile Pavements*, 1858, and he shows a general arrangement of tiles closely similar to the Kirkstall plan, except that the Jervaulx tiles are shown in blocks of six by six instead of eight by eight.

Samples of the Kirkstall tiles were forwarded to Mrs. E. S. Eames at the British Museum for comparison with their samples of the Jervaulx tiles. Mrs. Eames reports that the Kirkstall tiles are not of the same fabric as those from Jervaulx. She does, however, advise us that all the fragments submitted are of the same date, they are certainly not fifteenth-century tiles, and she suggests a date slightly earlier than mid-thirteenth century.

This report strengthens the view that the refectory floor, laid in the fifteenth century, was composed of older tiles. Whether these come from an earlier floor in the refectory, or were brought here from elsewhere, has not yet been determined.

Mr. G. K. Beaulah has drawn our attention to the circular centrepiece at Meaux, where the corner infilling is similar to the Kirkstall example.

C. V. Bellamy.

THE POTTERY

In the introduction to the first quinquennial volume, a brief chronological survey was made of the types of pottery current during the four centuries of the Abbey's active life. With certain modifications the sequence set out in those pages remains valid. Subsequent excavations have produced a considerable quantity of pottery and have added greatly to the range of shapes represented at Kirkstall. Some of these, such as the tubular-spouted pitcher (1956) and the pieces of lobed cups (e.g. 1954 No. 7), both from York, or the French polychrome fragments (1958 and 1959), are imports from further afield, but the bulk of the finds are in one or other of the two wares, believed to be indigenous to the vicinity, which are called, for convenience, Kirkstall ware A (gritty) and Kirkstall ware B (smooth). The sherds sealed by the meat-kitchen floor and so not later than the last quarter of the fifteenth century, the thirteenth-century pottery associated with the initial building of the infirmary, and the large quantity of predominantly sixteenth-century pottery from among the dump of bones found outside the meat-kitchen, all provide useful material for clothing the somewhat bare skeleton of the sequence attempted in 1955. It is still difficult to isolate fourteenth-century pottery; and since the fourteenth century was not a period of great building activity at Kirkstall this difficulty may continue. It is unfortunate that the fourteenth-century pottery from Pontefract Priory, which might have helped to fill the gap, appears to differ substantially, both in ware and shape, from anything so far found at Kirkstall.

During the five years covered by the reports in this volume a substantial amount of medieval pottery has been recovered from excavations in the city of York, from Pontefract, and from a number of sites in the East Riding. A study of this pottery reinforces the argument put forward in the introduction to the 1955 volume, that, between the early thirteenth and the late fifteenth century, though there may be a few shapes with a wide distribution, pottery, both as regards fabric and shape, was strongly local in character.

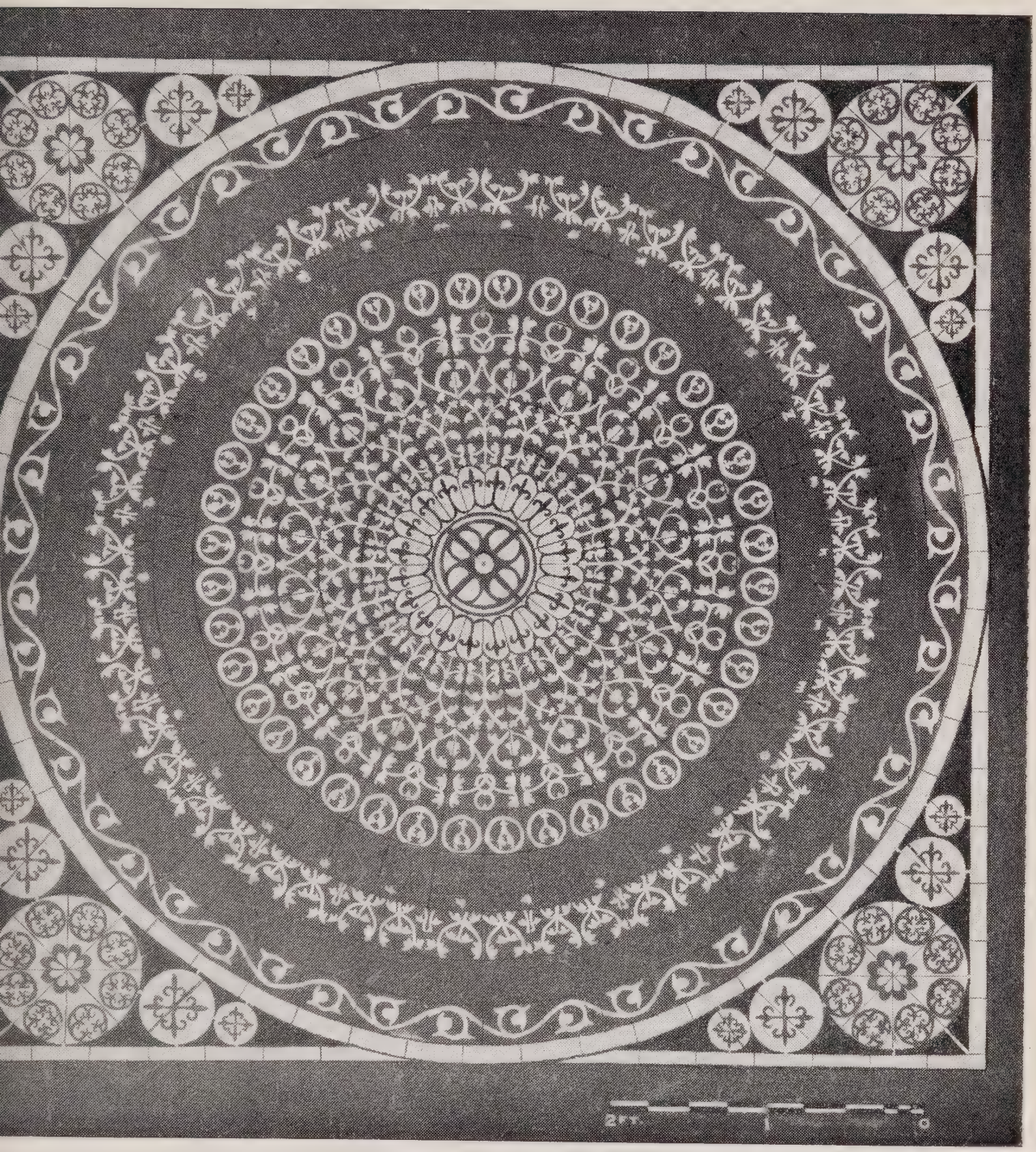
As far as the twelfth century is concerned, there is little to add to what was said in the earlier introduction. The gritty ware and somewhat angular rims which characterise the unglazed cooking-pots, bowls and occasional jugs, remain the sole type recognised as belonging to this period. It was not found in either of the areas which produced pottery of an early thirteenth-century date, and this is the more surprising since the type is known to have persisted for some time in other places. In the late fifteenth and sixteenth centuries, though local peculiarities remain, most sites produce at least some of the better-known shapes: large, rather high-shouldered jugs with one, two or three handles, sometimes with bungholes near the base; large multi-

handled cisterns; imported Rhineland stonewares; green, lobed cups; small pots and beakers in plain or decorated Cistercian ware.

The most important find during these five years was the two wasters in hard, smooth fabric (Kirkstall ware B, 1958), one of which had glaze over the fracture. This points to a kiln in the vicinity, since such fragments are not expected to travel far from their place of origin. So far the excavations have not produced any further indications of the whereabouts of a kiln.

There remains one important correction. In the report for 1958 is was suggested that dark brown glaze, owing its colour to iron in the glaze itself, was a late development at Kirkstall. The excavations of 1959 showed this type of glaze to have been in use as early as the thirteenth century.

H. E. Jean Le Patourel.



CENTREPIECE OF THE REFECTORY
TILE FLOOR

(a) REFECTORY LOWER FLOORS AND SCAFFOLD HOLES.

(b) REFECTORY TILES AND FLAGS.

Kirkstall Abbey Excavations

6th REPORT 1955

by C. Vincent Bellamy, B.Sc. and David E. Owen, Ph.D., F.M.A.

1. INTRODUCTION.

THE sixth season of digging at Kirkstall Abbey was carried out in two places. The whole of the refectory was excavated in a series of rectangles with baulks between which were later removed. The object of this was to plan the tile floor seen in 1953 and to note what floors lay beneath. It was further intended to re-lay a section of the tile floor in such a way that it could be left visible to the public. In addition, the thirteenth-century bath uncovered in 1951 was reopened. It was restored completely to the surface with a local stone very like that used in its construction. In this condition it, too, can be left open and visible. Whilst cleaning the bath, two members of the party (Messrs. Bellamy and Rigg) noted that a hole that appeared to be intended as a wastepipe would not carry away the water. They cleared it and found that it led to a small stone drain. They sank further trenches to this drain to trace its course.

The excavations were directed by Dr. David Owen and Mr. Vincent Bellamy. Mrs. J. Le Patourel took charge of the pottery as in previous seasons and Mr. and Mrs. Vincent Bellamy the tiles. Mr. Frank Rigg noted masons' marks on stones of adjoining buildings, and made a systematic examination of the whole fabric. His report is appended.

2. THE REFECTORY (or Frater).

The earliest structures on the site were described in 1953. They are the footings of the east to west wall that bounded the original refectory. They were laid bare from one side of the room to the other.

Perhaps contemporary with these foundations is a hearth—an area of red clay, deeply burnt, whose centre lies on the east side of the refectory about fifty-five feet from the cloister wall. This area is a semi-circle and is cut into by the foundations of the east refectory wall. Excavations on the east side of this wall in 1951 failed to show any red clay. Thus the clay was restricted to quite a small area, nine feet from north to south and perhaps seven feet from east to west. In the clay were some calcined bones. It is possible that this hearth is pre-monastic, perhaps belonging to hunters or the hermits who occupied the site when the monks arrived. It is much more likely to have marked a large bonfire where the brushwood was burnt as the ground was cleared. It could even have been used by workmen glazing or

roofing the original buildings. It must however have been a large fire and a very hot one, and have been kept burning for a long time. The purply-red clay is well burnt to a depth of four inches.

A little to the west of this hearth is a shallow trench filled with medieval material and containing a quantity of sherds of pottery. The trench is oval with its longer axis north and south. The clay within it is very soft. The jaw bones, teeth and several other bones of a horse were found in it. The trench is eleven feet long and about two feet across and is separated from the red clay hearth by cobbles. All are sealed by a good layer of sand. Mrs. Le Patourel notes that pieces of the same pot occurred in the trench, the cobbles and the sand floor.

The footings of the north to south refectory do not rest in a clearly-marked trench. Mostly they consist of quite small boulders tumbled into a narrow trench, and upon these stands the ashlar. Along the south, with the falling ground, they are considerably lower in level, their level dropping by as much as ten inches in the southern fifteen feet of the western wall.

Where they cross the drain the construction differs slightly. The trench is deeper and narrower and the lowermost course of the ashlar rests upon flags. This was probably considered to give a firmer foundation to the arch under which the drain runs.

The lowermost floor is of mortar and is best seen adjoining the west wall and in the south west corner. Elsewhere the mortar has partly or wholly decayed and is either absent or is represented by a layer of sand. The level rests on the footings. It drops in level with the footings to the south and is, in fact, even lower than the top level of the footings in places.

From the centre of the room southwards along the western wall and in the southwest corner is another mortar floor. This is much more even. Thus in the north of the room the two floors are usually quite indistinguishable. Centrally they are separated by an inch or two and it is only in the extreme south beyond the drain, that there is a difference of seven inches between their surface levels. As the higher mortar floor is also decalcified except near the wall, it is often missing altogether. In the centre of the room it is rarely possible to separate the two floors. In 1953, two early thirteenth century coins were found associated with sand which was clearly part of one of these two floors (Fourth Report). At thatt ime there was no evidence that there were two older floors, and these coins suggested an early thirteenth-century date to te whole north to south building. If they belonged to the upper of the two older floors then their date would have no bearing on the date of the walls..

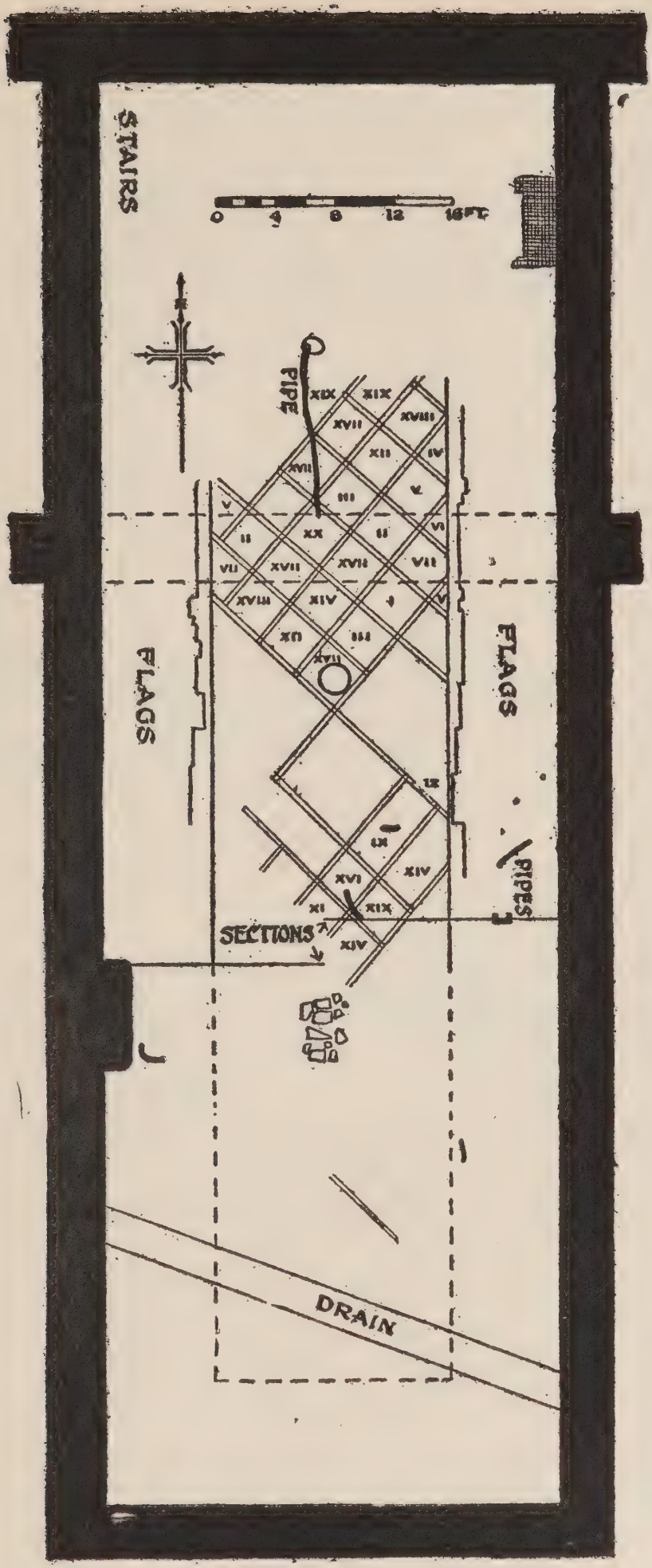


FIG. 1. PLAN OF REFECTORY.

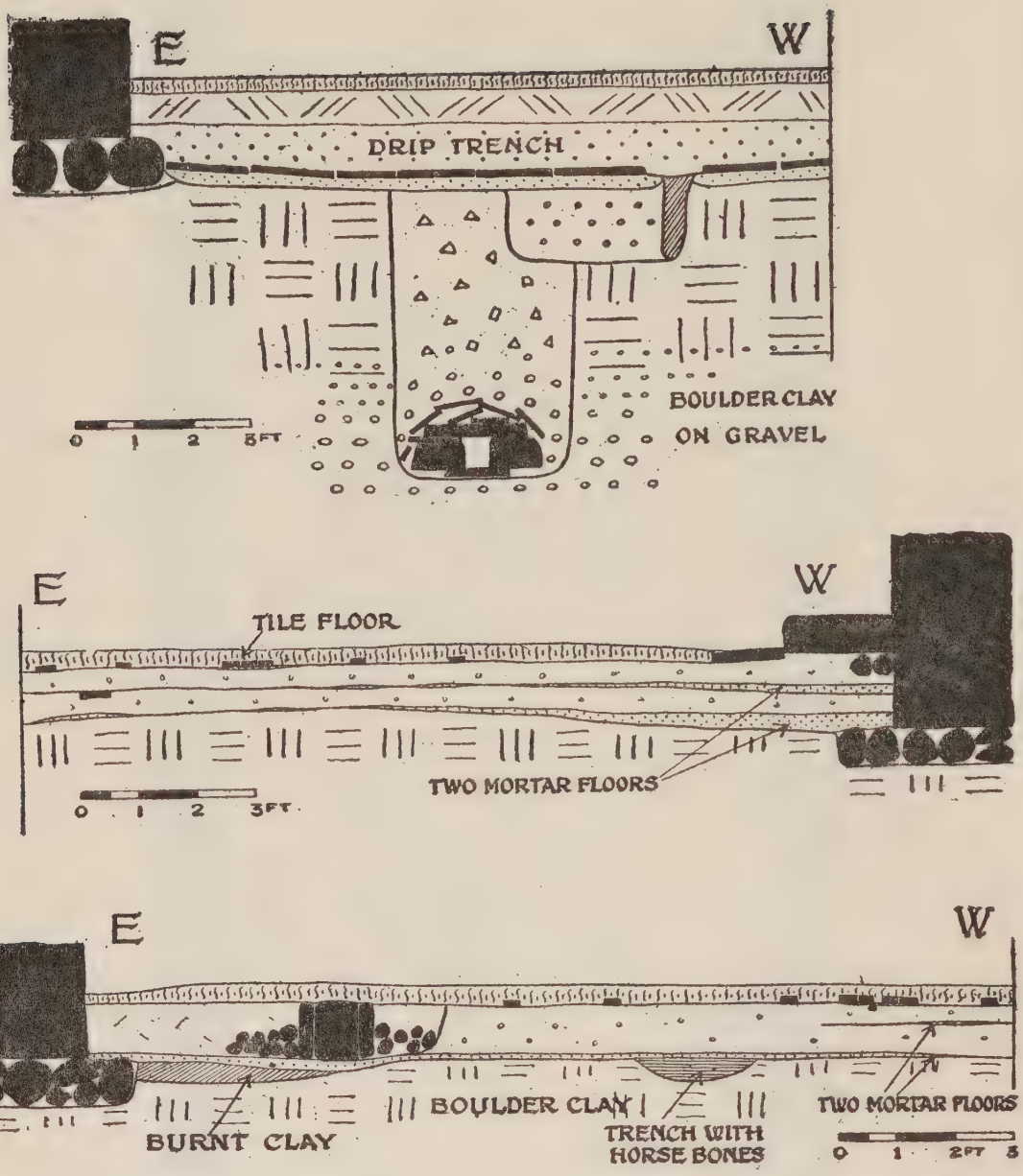


FIG 2. SECTIONS: TOP, THROUGH BATH DRAIN ALONG LINE OF DRIP TRENCH;
MIDDLE AND BOTTOM, ACROSS REFECTORY.

One of the fifteenth-century alterations which was carried out in the refectory was the filling in of the *pulpitum* and the building of a fireplace in the wall. This is to be seen on the western side. Both older floors pass clearly beneath this fireplace and are of much earlier date.

The main drain of the abbey crosses the southern half of the room obliquely. Nineteenth-century restoration work has laid this open where it adjoins the east and west walls. In the centre, the original drain is untouched. Upon the heavy roofing slabs are small pebbles and boulders, and the lowermost floor is laid upon these.

Between the two floors where they are separated is a layer of brown stony clay. On top of both and forming a make-up for the higher floor is a similar layer. Where the upper floor is not present, it is impossible to separate these two layers.

The alterations to the refectory in the fifteenth century were considerable. An upper floor was added and this entailed the blocking up of the windows which had served for the single high room and the building of other windows at two levels. At the same time, the *pulpitum* was filled in and a large chimney built in its place. The *pulpitum* appears to have been reached by a small doorway and passage in the thickness of the wall and the actual *pulpitum* was surmounted by a single round-headed arch. Careful examination of the stonework suggests that the stairs twisted round to the left in the doorway. The *pulpitum*, the passage and the doorway were all filled in carefully before the chimney was built. The footings in the infilling of the doorway are at a higher level than the wall footings. Those below the hearth stand eighteen inches above the wall footings. A round-headed window to the north was also filled up.

At this period, a second entrance was made from the cloister, and stone stairs were built opposite to the older entrance. This was fully discussed in the Fourth Report. Then the tile and flag floor was laid over the whole room. It was noted in the Fourth Report that one or two post holes were medieval and that they undoubtedly held the scaffolding used in the alterations to the walls. Many more post holes of this date have now been found. Mostly they cut the lower floors and make-up, and are sealed only by tiles or flags. Occasionally, as in the south west corner, they are sealed by the make-up as well. They are rather smaller than the even more numerous scaffolding post holes of the restoration work, with a diameter of two feet. Those on the west side are mostly five feet from the wall and have a depth of eighteen inches below the floor that sealed them. Those on the east are mostly four feet from the wall and a few inches shallower.

Unfortunately, falling masonry, the removal of trees and undergrowth, the siting of scaffolding and the fact that probably

both flags and tiles have been carried away from time to time, make it impossible to reconstruct the floor completely as it was laid. There is, however, a good area where the floor is little disturbed and there are numerous other parts of the room where odd tiles are clearly still in place. Thus a section has been lifted and carefully re-laid to show how it must have looked in the fifteenth century.

The fifteenth-century floor is of great interest. Its remains are too fragmentary in places to allow a complete description but it is possible to gain a very good idea from what is left. Along both the east and west sides of the room were laid flagstones. Their outer edges were not quite even and the widths varied from seven feet six inches to as little as six feet three inches. The widths were made up to seven feet six inches by blue and yellow three-inch tiles laid parallel to the walls and set chequer pattern.

The floor was disturbed too much at the north end to get any idea of the arrangement. In the Fourth Report it was noted that the eastern flags were bounded on the north by a short wall or curb standing on the earlier footings. No such wall was to be seen on the west, but the flags did not continue farther north than this point. The flags were bedded on sand and the sand continued farther north for at least another ten feet on both sides. It is certain, however, that the flags did not run the whole way round the decorated tile centre. In the north-east, backing the warming house fireplace, are nine rows of three-inch blue and yellow tiles set chequer pattern, and there are indications of several further rows. Perhaps these small tiles replaced the flags in the north end of the room.

In the southern half of the room the flags are again missing but there are indications that they extended along both sides to the extreme south and also along the south wall. The seven-foot-six area adjoining the walls is devoid of tiles though occasional fragments of flag are found. In the centre of the room, on both sides and on top of the drain are occasional tiles, some of them clearly still *in situ*, with their mortar beneath them.

Within the seven-foot-six limit, is the floor of patterned tiles, which are laid in blocks approximately three feet square, each block containing eight rows of eight tiles. The tiles within any block are all of the same pattern, but the pattern changes from block to block. The blocks themselves are separated by a diagonal grid of yellow three-inch tiles edged with triangular halves of three-inch blue tiles, and the whole is laid diagonally to the border.

Individual patterned tiles vary in size between four-and-a-quarter and four-and-a-half inches square, probably due to uneven shrinkage when drying, and consequently the blocks of sixty-four do not always give squares of the same size. To

accommodate this variation, the lines of the diagonal grid converge and diverge, and the over-all pattern is somewhat irregular.

There is further distortion of the floor because the grid has not been laid accurately at 45° to the border and this gives a slight slant in an anti-clockwise direction to the entire patterned area. In places thin wedge-shaped fillets have been inserted to reduce this irregularity, but they do not fully correct it. In one or two cases less than sixty-four tiles have been laid in a block, and in one case there were only seven rows of eight four-and-a-half inch tiles, then a row of three-inch tiles of quite different pattern.

There is evidence that the floor was badly worn before the Dissolution because broken tiles have been repaired with mortar and missing tiles have been replaced with pieces of thin flag, or by tiles of different pattern laid face downwards, or just by plain mortar. Possibly the whole floor was originally made of tiles from a previous floor, or older tiles had to be used for patching. Lane, in his "Guide to the Collection of Tiles in the Victoria and Albert Museum" suggests that tiles of 15th century manufacture can be distinguished from those of 13th or 14th century make because in the later tiles the white clay is applied to the stamp before the impression is made. It appears that this gives a much shallower inlay, and that the edges of the pattern are not so clearly defined. By these criteria the refectory floor contains tiles of different periods, though on other evidence it was certainly laid in the fifteenth century. The majority of the tiles appear to have been made in the fifteenth-century manner.

Normally the background of the pattern is in deep blue, and the design itself is inlaid in white slip. Five of the patterns also occur in reverse colouring. All the tiles seem to have been given a thick coat of transparent yellowish lead glaze.

The patterns themselves are simple floral or geometrical designs, sometimes complete in a single tile, some requiring four tiles to make a pattern unit, and sometimes the pattern is a running design which could extend indefinitely.

In addition to the square patterned tiles a number of curved tiles were found. About one third of a ring was noted *in situ* about 41 feet down the room from the northern wall and equidistant from the east and west walls. This gives a circle of one foot ten inches internal diameter and one-and-five-eighths inches wide. There would be eighteen tiles in the complete ring, and some of them carry a single letter of the alphabet. The others were too badly worn to give any indication of pattern. There was no sign of tiles or mortar within the ring, but patterned tiles of the usual type occur outside it, to complete a diamond of the regular grid. The circle was in fact slightly off-centre to its containing diamond and this suggests that the ring

was associated with some structure placed centrally to the width of the room, which could not be moved to fit in with the general irregularity of the floor. There was no sign of footings underneath this area.

A similar association of tiles was found in disturbed ground farther south, consisting of parts of a similar ring and some patterned tiles to fit outside the ring. There were some large cobbles grouped in the same disturbance, and these may have been the foundations for a pillar to support the upper floor.

Many other tiles with one or more curved edges were found scattered about the room, but only one small group seemed to be *in situ*. They were of various sizes and shapes and some of them showed traces of patterns quite different from any previously recorded. This collection was carefully sorted and graded, and it became evident that many of them were parts of a series of concentric rings, and eventually an ornamental centrepiece could be envisaged. The radius of curvature of tiles in the outermost ring suggested that the centrepiece must displace four blocks of patterned tiles together with that section of the diagonal grid which passed between those blocks. At the corners there was room for a cluster of five discs, and appropriately-shaped pieces to fit between these discs were also found. The assembly as now portrayed in the relaid floor is based upon deductions from the dimensions of the tiles found. The only components of this centrepiece found *in situ* were a disc, six inches across, now placed in one of the corners, and two tiles of the outermost of the concentric rings. The position in which these were found is not inconsistent with the design suggested, and would suggest that the centrepiece was in fact almost in the centre of the room; a slight displacement could be a reflection of the general irregularity of the floor already mentioned. No four-and-a-half inch patterned tiles were collected from the area which it is suggested the centrepiece occupied.

Only a small proportion of the tiles of the concentric rings was found, though most of the corner units are to hand. Many tiles of similar shape are to be found, however, in the relaid floors in the southernmost chapel of the south transept of the church, and within the great west door. These are of uncertain origin and may have come from the refectory floor. Most of the other tiles in the chapel are four-and-a-half inch patterned tiles of the same patterns as in the refectory.

The colour scheme for the centrepiece is at variance with the rest of the floor since the background is here greenish brown, and the white slip pattern is tinted by greenish glaze. The patterns, so far as they can be determined, are abstract foliage designs, badly executed, with shallow inlay and considerable spreading of the slip over the edges. Lane suggests that tiles

with curved outlines survived through the 13th century, but the patterns of these tiles are more in conformity with his description of fifteenth-century products.

There were two or three groups of tiles found, consisting of triangular halves of blue three-inch squares, arranged to give a square block of six inches. There may well have been other such groups. Their place in the floor could not be determined, but they do not seem to occur in the border, as suggested by their use in the chapel floor.

It is estimated that the full floor of the refectory must have contained over 20,000 tiles, of which about 8,000 would be four-and-a-half inch square patterned tiles. The centrepiece would require about five hundred shaped tiles. Sufficient tiles were recovered to relay an area the full width of the refectory and extending about 14 feet from north to south. All the different patterns are represented, including the smaller ring and a section of the centrepiece. About 3,000 tiles were re-used.

Halfway along the eastern side of the refectory is a small stone structure surrounded by cobbles. It occurs in a place where the flag and tile floor is completely missing. It seems possible that it had some significance in the demolition work at the Dissolution, as the floor seemed to have been ripped away fairly cleanly around it. Its shape is such that it might have held a stout pole of square section, possibly to help in the loading of lead melted down on the spot. The cobbles continue to the south for a distance of ten feet but they are loosely thrown in.

The sequence of events seems then to have been the clearing of the area and possibly the burning of the brushwood, then the building of the first refectory, though there is no trace of its original floor. The larger north to south refectory was then built, and there is no reason to believe that its age was anything other than late twelfth century as St. John Hope suggested. This building was floored throughout by a good thick layer of mortar which dropped in level southwards, particularly south of the drain. At a later date, perhaps during the time of the numerous thirteenth-century alterations, the inequalities of the floor were filled with clay, and another, more even, mortar floor was put down. This served the building for a good two hundred years.

In the fifteenth century, the structural alterations already mentioned were made. The area was once more levelled up with clay and the tile and flag floor was put down. It has been suggested that as in the case of Fountains the tables were around the sides of the room on the flag surround and that the patterned centre was kept clear and visible. The room at this period was the *misericord* and was entered by the more easterly doorway from the cloister. The food was cooked in the meat kitchen.

At the Dissolution, lead was ripped out and some probably melted down on the spot. The lovely floor was left to destruction from falling roof timbers and masonry and to the ravages of nature. It is fortunate that such an area is still preserved.

Also worthy of record are the pipe holes which were so numerous. Unfortunately, it was not possible to trace any of them far. They were mostly horizontal holes in the ground, of diameter varying from one to three inches, which doubtless once held lead pipes. None had its pipe, but in some it was easy to see how the hole had widened as the pipe was pulled out.

There was a curved length of pipe three inches wide which ran almost centrally from north to south. In the north it started in a deep disturbance just over a foot from north to south and eighteen inches from east to west. This disturbance was sealed by a layer of sand which may represent the younger of the two lower floors, or may equally be part of the make-up of the mortar floor. It cut through the lowermost sand layer which is undoubtedly the lowest floor. From this disturbance, the hole went down immediately beneath the lowest floor and continued south for fourteen feet coming up again at the footings of the south wall of the original refectory. Here it finished. Ten feet and ten feet six inches north of this wall, two smaller holes one inch in diameter came up vertically but were also sealed by the sand of the lowermost floor. They ran entirely in clay which was stained brown as with iron.

For three feet to the east and south of the disturbance at the north end of the pipe was an area of red burnt clay which rested upon the lowest floor but was covered by the sand which sealed the disturbance. In the Fourth Report similar areas of burnt clay were noted and suggested as sites of small hearths for the melting of lead for glazing, roofing or plumbing. Similar hearths probably occurred during the earlier alterations.

To reconstruct, it would seem that this pipe came to a circular cistern placed almost centrally in the first refectory. It went south to the wall where it may possibly have collected water from the roof. Two smaller pipes came up from it for some other purpose. When the lowermost sand floor was laid, the two small pipes were cut off. Later, perhaps in the fifteenth century, the whole cistern was removed and the pipes pulled out. It is of course possible that the pipe continued southwards beyond the footings but its traces were destroyed when it was removed.

Other pipe holes were all of small diameter and the short lengths visible gave little information of the former lay-out. One short stretch of two feet lay beneath the oldest mortar floor adjoining the fireplace. Several other similar short lengths of pipe hole were found near the eastern wall and also in the centre

of the room, but these were in the clay make-up of the tile and flag floor. Three which rose vertically near the centre of the long eastern wall, may have fed drinking water taps at this point. None of the actual lead pipes was found and doubtless most were dragged out at the Dissolution.

3. THE MONASTIC BATH

The monastic bath is described fully in the Second Report, and the lead pipe which reached it from under the warming house floor was examined the following year. It will be remembered that the dating of the construction of the bath was based on the evidence of this pipe and its trench. The pipe came from the vicinity of the thirteenth-century wash basins in the cloister. Its trench did not run straight across the warming house to the bath, but curled round the massive supports of the staircase to the monks' dormitory. Clearly these supports had either been completed when this trench was cut, or at least they existed in plan. This staircase was dated to the thirteenth century by St. John Hope, largely because it was entered by a fine Early English Gothic doorway, which replaces a much lower round-headed doorway far too low to have allowed entrance. The pipe trench was perfectly sealed by a floor which clearly belonged to the same series of alterations. This floor rested directly on the footings of the staircase supports.

The clear stratigraphical evidence of the age of the bath is repeated here, as otherwise it might appear that the bath had been built at an earlier date.

In clearing out the bath afresh and making ready to restore it and rebuild its walls and steps, the back-fill of 1951 was first removed. This done, there was still some medieval fill where the upper steps had been. This was taken out. In it were sherds of pottery of fifteenth-century type and a Calais Groat of Henry VI c. 1424.

The only feature which had not been observed earlier was the absence of a small stone about six inches long and three inches thick from the bottom course of the south wall near the step. Close examination showed that this was intentional and that it provided a plug hole. No doubt a shaped stone could be slipped in easily when the bath was to be filled.

It had been considered that the bath would be emptied by allowing the water to seep away into the glacial gravels. This would be slow particularly if the level of the bath had been high.

The plug hole at the bottom of the bath was found to be solidly packed with gritty clay and when this was removed a stone-lined channel, about five inches square, was found. A new trench was taken down to the level of this channel some feet

south of the bath, and later, further trenches were dug to determine the course of the drain across the courtyard. The drain proved to be laid in a trench some three feet wide and six and a half to seven feet deep. The sides were vertical and the filling was a mixture of boulder clays and the lower glacial gravels with occasional pieces of flat stone, some flecks of charcoal, and a few sherds of thirteenth century pottery.

The drain itself is constructed of roughly shaped stone of the same type as was used to build the bath, the floor being of fairly flat sandstone, two to three inches thick, the walls of single stones usually about five inches thick with a flat face to the inside but quite irregular otherwise. The roof is again of flat stones, irregular in shape, and varying between one inch and about four inches in thickness. The joints are uneven and successive stones are seldom truly in line, but all the stones are bedded in yellow clay and the joints caulked with the same material. To the outside of the walls small cobbles are firmly packed to the limit of the construction trench. In two of the four sites, irregular pieces of thin flagstone were laid around the drain and above the roofing stones to cover the joints, but these supplementary stones were omitted in the other two sites (fig. 2).

The channel averages about five inches wide and between four and five inches high and was solidly packed with accumulated silt. In the upper half of the yard this was sandy clay but farther south increasing numbers of small cobbles also occur. There were no small finds from the silt despite the fact that some 36 feet of channel was cleared.

The floor of the drain is level with the floor of the bath and about six and a half feet below present turf. At this depth the natural boulder clay has given way to the glacial gravels (*See Second Report p. 14)* and these are fairly pervious. The careful caulking of the joints suggest that the builders were anxious that the water should not seep out of the drain into the gravels at least until it was clear of the main buildings.

No recognisable floor levels have been found in the courtyard except in the vicinity of the bath (Second Report) but the drain trench is covered with a medieval make-up from which several pieces of pottery have been recovered. In no case does the construction trench cut through anything other than natural levels. It runs down the courtyard in a rather erratic course but generally heading slightly west of south. On the way it passes under the floor of the east-west drip trench (Second Report) under the passage north of the meat kitchen, under the main abbey drain in the angle between the back of the large oven and the meat kitchen wall, and appears in the meat kitchen itself. It runs right up to, and is cut by, the walling of the main abbey drain. This would suggest that the bath drain is of earlier date than the main drain, but this conclusion conflicts with all the

other dating evidence. The explanation may well be that a section of the main drain was temporarily removed to permit the building of the bath drain. A slab from the floor of the main drain was removed immediately above the bath drain trench, and some small sherds of pottery and a piece of lead found there.

The level of the bath drain has an almost negligible fall down the warming house yard, but dips more steeply to pass some three feet below the main drain, and was still falling where seen in the meat kitchen. It seems likely that the drain continues across the meat kitchen and under its southern wall, but knowledge of its ultimate destination must await further excavations. The total length so far discovered is about 65 ft.

4. SMALL FINDS OTHER THAN POTTERY

1. Metalwork

(a) Coin. An annulet Calais groat of Henry VI (Group I 1424-25) was found in the medieval infilling of the bath steps. *obv.* Crowned head facing. HENRIC DI GRA (REX ANGL) Z FRANC. *rev.* Cross, Three pellets in each segment POSVI DEVM ADIVTORE MEVM. VILLA CALISIE.

(b) Copper. Amongst many fragments of copper were a few of interest. Five inches of quarter-inch diameter copper piping occurred in the make-up of the tile floor, halfway down the east side of the room. Three inches of eighth-inch diameter copper piping was in a similar position on the same level in the west side of the room. A small book buckle was in the unstratified layers adjoining the main drain. Two-and-an-eighth inches long and three-eighths inches across, it had a slot at one end and the other end was rounded. It was decorated with a pattern of circles, each with a small central depression. In the circle furthest from the slot, this depression was deepened into a hole. Two short lengths of thin copper edging or binding came from the make-up of the tile floor.

(c) Iron. Deeply rusted iron nails occurred at all levels.

(d) Lead. Fragments of window lead occurred at all levels particularly in the make-up of the tile floor. This was to be expected, for considerable alterations were being made to the windows. A circular disc, seven-eighths of an inch in diameter showed curious markings like the internal mould of a shell. There was no sign of an attachment but it was probably part of a seal.

(e) Metal slags. Slags of iron, similar to those already described, occurred at all levels, particularly beneath the tile floor and the mortar floors.

2. Stone.
   (a) Flint. Forty-nine flint flakes were found in all levels, but mostly in the lowermost lying near the upper surface of the boulder clay. In addition were five chips of platy chert.
   (b) Kiln prop. Another wedge-shaped stone, two inches high on a two-inch square base was covered, on all sides but its base, with green glaze. It was found in the make-up of the tile floor centrally in the room.

3. Shells.
   Shells of oyster and mussel were fairly common in the upper layers including the make-up of the tile floor.

4. Bones and Teeth.
   Bones and teeth of an old horse were buried in a small trench below the mortar floor levels in the eastern centre of the room. A molar of pig came from the make-up of the mortar floor nearby. Molars of sheep and pig occurred in the make-up of the mortar floor and molars and incisors of ox were unstratified. Large fish vertebrae, possibly salmon were also in the make-up of the tile floor.

5. Glass.
   Fragments of dark painted glass occurred in the make-up of the mortar floor in the east centre of the room. Fragments of clear glass were unstratified.

5. THE PATTERNED TILES. By C. Vincent. Bellamy, B.Sc.

The patterned tiles are laid in blocks as described. The blocks themselves are separated by a grid of intersecting lines running diagonally from the border, each line marked by a single row of three-inch yellow tiles laid corner to corner, and an adging of blue triangles (fig. xxvi).

Larger triangles (figs. xxi and xxiv) are used immediately within the border as bases for the diagonal rows of patterned tiles.

The yellow tiles of the grid are similar to those used in the border. The triangles have been cut from blue border tiles by scoring them before firing, and breaking them in half afterwards. Smaller triangles, quarter-blues, were needed at the intersections of the grid and they have been produced in the same way. A few tiles were found which had been scored for this purpose, but not broken.

The larger triangles, though clearly half-patterns of xvi and ii respectively, were completely cut before firing.

The individual patterned tiles seem to have been prepared as four-and-a-half inch squares, about one inch thick, but have shrunk in varying degrees when dried.

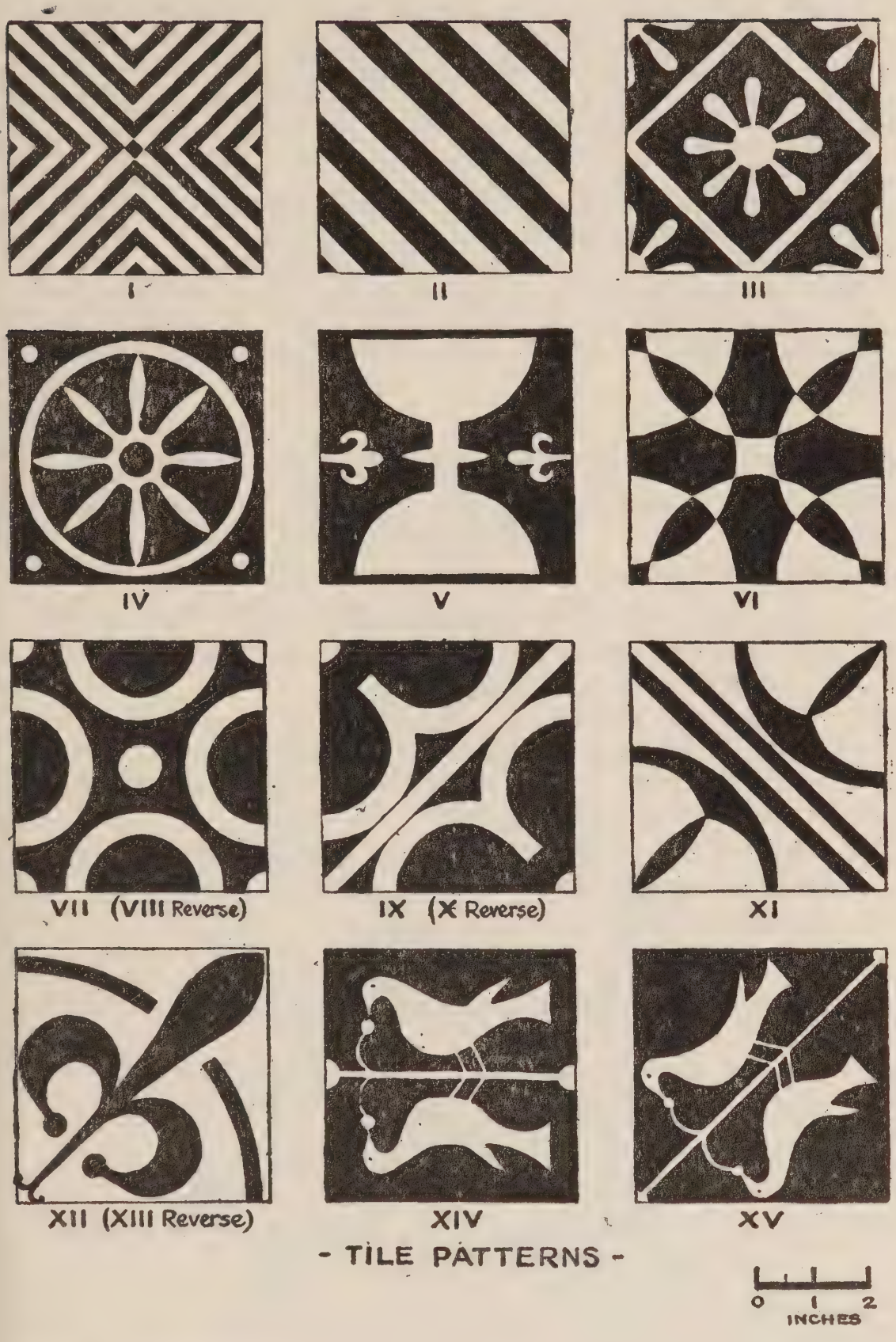


FIG. 3. TILE PATTERNS.

Mr. Ronald Cooper of Leeds College of Art points out that the tiles were placed on edge in the kiln for firing, with tiles of upper tiers resting on and at right angles to those of lower tiers. Where the tiles were in contact, they became fused with glaze and had to be broken apart after firing. A number of tiles show evidence of this.

The various patterns on the tiles are illustrated in figs i to xx. Some of them are complete on a single tile (iv, xiv, xv, xvii and xviii) and there is no problem of orientation. Others are only fully expressed by groups of four tiles laid in squares (ii, ix, x, xi, xii, xiii, xvi, xix and xx), whilst patterns i, iii, vi, vii and viii, give a continuous design. Pattern V tiles were laid to produce strings of circles.

FOUR-AND-A-HALF INCH INLAID PATTERNED TILES.

Deep blue background, white slip, and transparent yellow glaze.

i Pattern fairly deep with good clean outlines.

ii Shallower inlay, bands uneven width and outlines blurred.

iii Shallow but clean outlines. One of diagonal spokes consistently detached from centre.

iv Deep inlay and clean outline. Tiles more affected by shrinkage than any others, giving distinct camber to each tile and slight chamfer to edges. Seem harder than most and in better state of preservation.

v Fairly deep inlay and pattern clearly defined but badly worn.

vi Fairly deep and clear. Pattern usually well preserved.

vii and viii. Shallow and poorly marked.

ix Outlines poor and inlay shallow.

x Much better than ix. One is devoid of inlay and could be used as a stamp for ix.

xi Shallow and poorly printed. Lines uneven in width.

xii Poor outlines and fairly shallow.

xiii Seem much better than xii, deeper and sharper.

xiv Shallow but clean lines. Usually badly worn.

xv As xiv but much more broken. These do not seem to have been made with the same stamp as xiv.

xvi Fairly deep with good outlines.

xvii Shallow and diffuse pattern in contrast with

xviii which is much sharper and deeper.

xix Deep and sharp outlines.

IG 4 TILE PATTERNS continued.

xx Shallower and less cleanly defined.

xxi As xvi.

xxii and xxiii Three specimens only and placing in floor uncertain. May have been used for patching. Do not occur on intersections of grid though this may have been their original place. Harder and heavier than most with sharp outlines. Glaze a deep olive green.

xxiv as ii.

xxv The odd tiles used with xviii to complete a block in which there was not room for usual sixty-four four-and-a-half inch tiles. Background brownish.

xxvi Showing the make-up of the grid diagonals and their intersection. Three-inch squares with thick coating of white slip and transparent yellow glaze, and halves of blue three-inch squares.

THE ORNAMENTAL CENTREPIECE.

Patterns xxvii to xliv. Plate 1.

Colours reddish-brown with white slip and coated with greenish glaze. Patterns shallowly inlaid and badly printed, outlines very diffuse and irregular.

xxvii Solid disc two inches in diameter, traces of white slip and was possibly completely coated with white. One only.

xxviii Quarter circles, eight inches external diameter. Only three pieces found, one with fairly clear pattern as illustrated, second with traces only and may be in reverse colours; third badly worn.

xxix and xxx Several specimens, about half of them showing patterns clearly and remainder without any traces. Several more of these in chapel floor, and total is more than the twenty needed for this position. Possibly a smaller version of the centre-piece occurred elsewhere. xxix is three inches deep and xxx extends a further two inches.

xxxi, xxxii and xxxiii. Each about three inches deep and requiring twenty tiles to complete the circle.

xxxiv No satisfactory tile found. Pattern appears to be as shown but the diagram may be incomplete. Forty needed.

xxxv A few tiles of appropriate size for this ring but none shows patterns.

xxxvi Several tiles for this ring but all badly worn except two which have been in museum and appear to fit here. One bears the letter "s" and the other "z". Probably thirty needed for the complete ring. External diameter of ring about four feet five inches.

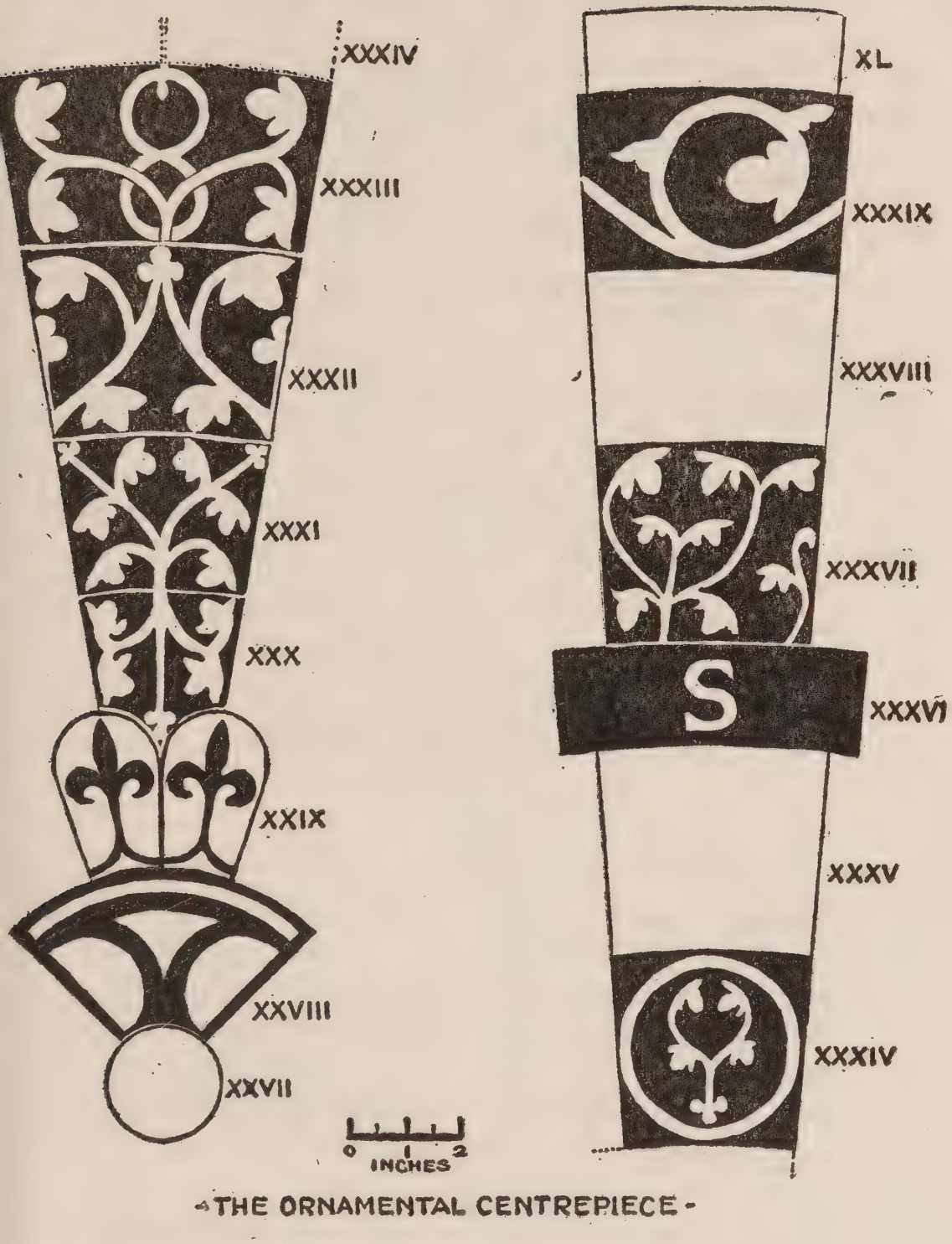


FIG. 5. TILE PATTERNS continued.

xxxvii A few good tiles with clear pattern as shown, or with design reversed from left to right. Probably forty-eight in complete ring.

xxxviii No convincing tiles for this ring. Size assumed.

xxxix Few broken tiles with pattern as shown, or may have been twice as wide giving two whorls to each. Assumed forty-eight in ring.

xl These and the straight tiles which fit beyond the corner units were completely coated with white slip. Sizes of the few unbroken ones suggest that there would be fifty-four in the ring.

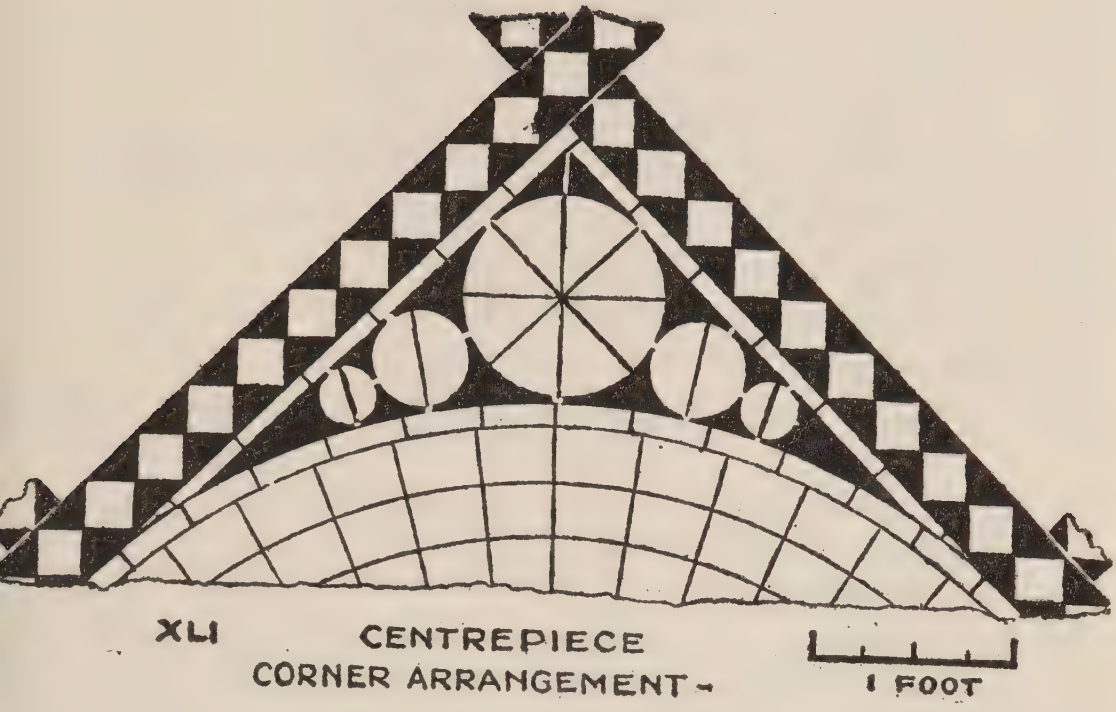
xli to xliv Details of the corner units outside the concentric circles. The discs are respectively twelve, six and three-and-a-half inches diameter. The six-inch discs are usually in two pieces but one example was made in a single piece. The triangular fillings have no trace of pattern or slip except two which are deep mottled green.

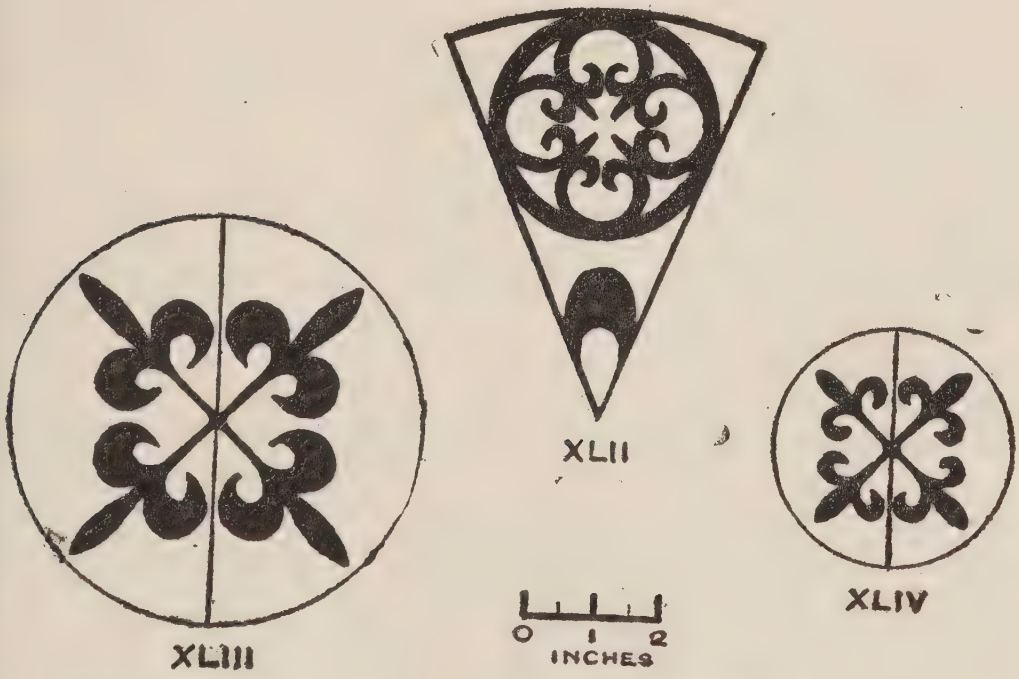
xlv The smaller circles. The curved edges of (b) and (c) were cut before firing. The (a) tiles are standard four-and-a-half inch patterned tiles (pattern xvii); (b) is cut from such a tile but (c) is longer than the standard ones. It bears the same pattern. The (d) tiles are similar to pattern xxxvi but are shorter and wider (about $4\frac{1}{8}$″ and $3\frac{5}{8}$″ by $1\frac{5}{8}$″). Letters white on reddish brown background.

6. **MASONS' MARKS.** By Frank Rigg.

The Masons' marks figured have all been noted this season. Their positions are as follows.

1. West door of meat kitchen, north jamb, outside.
2. South door of meat kitchen, east jamb, inside.
3. South door of meat kitchen, west jamb, inside.
4. West wall of meat kitchen, south side.
5. South east door of refectory, top of south jamb.
6 & 7. North wall of abbot's lodging, outside.
8-12. Ground level, oriel window, visiting abbot's lodging.
13. South side of cupboard in refectory, low.
14-20. Monks' reredorter, in main drain.
21. West side of west arch of lavatorium in cloister.
22. In church, south side of east window.
23. South transept, south chapel, in piscina. In two positions.





IG. 6. TILE PATTERNS continued.

24. In church, south side of east window.
25. In church, north side of east window.
26. In church, north side of east window.
27. In church, north side of east window, appears twice.
28. On north east pillar of the church crossing.
29-35. Monks' reredorter, in main drain.
36. West end of church, south of door, outside, on ground level.
37. North end of lay brothers' building.
38. West end of south cloister in large Norman arch, appears twice.
39. West end of church, south of door, outside.

7. THE POTTERY. By H. E. Jean Le Patourel, B.A.

The pottery this year, though over 650 sherds were found, was mostly in small fragments representing a very large number of vessels. In one case only was it possible to reconstruct a section. The distribution of the different types of ware is interesting. Some 67% of the total was composed of pieces of unglazed cooking pot of the kind known to date from the late twelfth or early thirteenth century. Of the remainder more than half were of very late date (stone-ware, Cistercian ware etc.), leaving less than 15% to represent the later thirteeenth, the fourteenth and the fifteenth centuries.

Of the twelfth-century sherds, the remains of two pots are of special interest. One is a little cooking pot of which a complete section was found (Fig. 10. No. 1). Kirkstall has not hitherto produced more than fragments of these small pots, and it is interesting to compare the shape of this first example with that of its larger counterparts. The rim diameter is slightly greater than that of the base, the sides are almost vertical and the base quite flat; in all these features it differs from the larger cooking pots of the same period.[1] The other is the lower part of a typical example of these latter (not illustrated) which came from the refectory. It deserves mention for the fragmentary remains of a design in applied thumb-pressed strips on its lower wall. Such decoration has been found before at Kirkstall and elsewhere.[2] Usually it appears to serve the double function of decoration and of strengthening the somewhat fragile walls of these large pots. In this case however the position of such ornament as remains suggests that the strips were purely ornamental.

[1] Kirkstall 1951, Fig. 6, p.24.

[2] Kirkstall 1953, Fig. 18, no. I, p.66. See also two pots from Huttons Ambo, in the Yorkshire Museum.

The rim of a partly glazed bowl (Fig. 10. No. 10) presents an interesting problem The fabric is of the usual twelfth-century type and the rim resembles that of many of the cooking pots of that period; but the thick yellow-green glaze and the stout thumb-pressed handle springing directly from the rim, suggest a somewhat later date. The construction trench of the drain from the bath (see p. 10) contained part of the base of a cooking pot (Fig. 10. No. 12). Other parts of this same pot were found during the excavations in the north-east corner of the courtyard in 1951. The pot is of the gritty, heavy-walled type found beneath the mortar floor in the warming house, and may be dated with reasonable assurance to the second half of the thirteenth century.

Several pieces of Cistercian ware, both plain and decorated, were found, two of them beneath the tiled refectory floor. The most interesting was part of the neck and handle of a small brown-glazed bottle, a new shape at Kirkstall, though a complete vessel of this type survives in the British Museum.[3]

DESCRIPTION (see Fig. 10).

1. Small twelfth-century cooking pot; buff, gritty ware; flat base and angular everted rim.

2. Similar ware, but with grey core.

3. Similar ware, pink-buff, with external blackening. The simple rim is unusual, but not unknown on this type of pot.

4-9. Rim sections of similar cooking pots of which not enough remains to give an exact diameter. It is not yet known whether these different rim shapes have any chronological significance. These may be compared with similar forms from Knaresborough Castle.[4]

10. Bowl with yellowish-green glaze on rim, handle and interior surface. Exterior unglazed on surviving fragment. The fabric and rim section resemble those of the twelfth-century pots.

11. Part of a bowl with elaborate rim treatment. Beneath the simple everted rim is a small plain roll of clay. Beneath this again is a larger roll formed into a twist. The exterior and part of the interior have an olive-green glaze. Fabric soft.

12. Part of rounded base of cooking pot. Gritty ware, thick walls, interior buff, unglazed; exterior red with trickles of olive-green glaze running down the sides, presumably from a glazed or partly glazed rim. Probably thirteenth century.

[3] R. L. Hobson, *Catalogue of English Pottery in the British Museum* (1903), p.92.

[4] *Antiq. Journ.* vol. xxxiii, 1953, p.212.

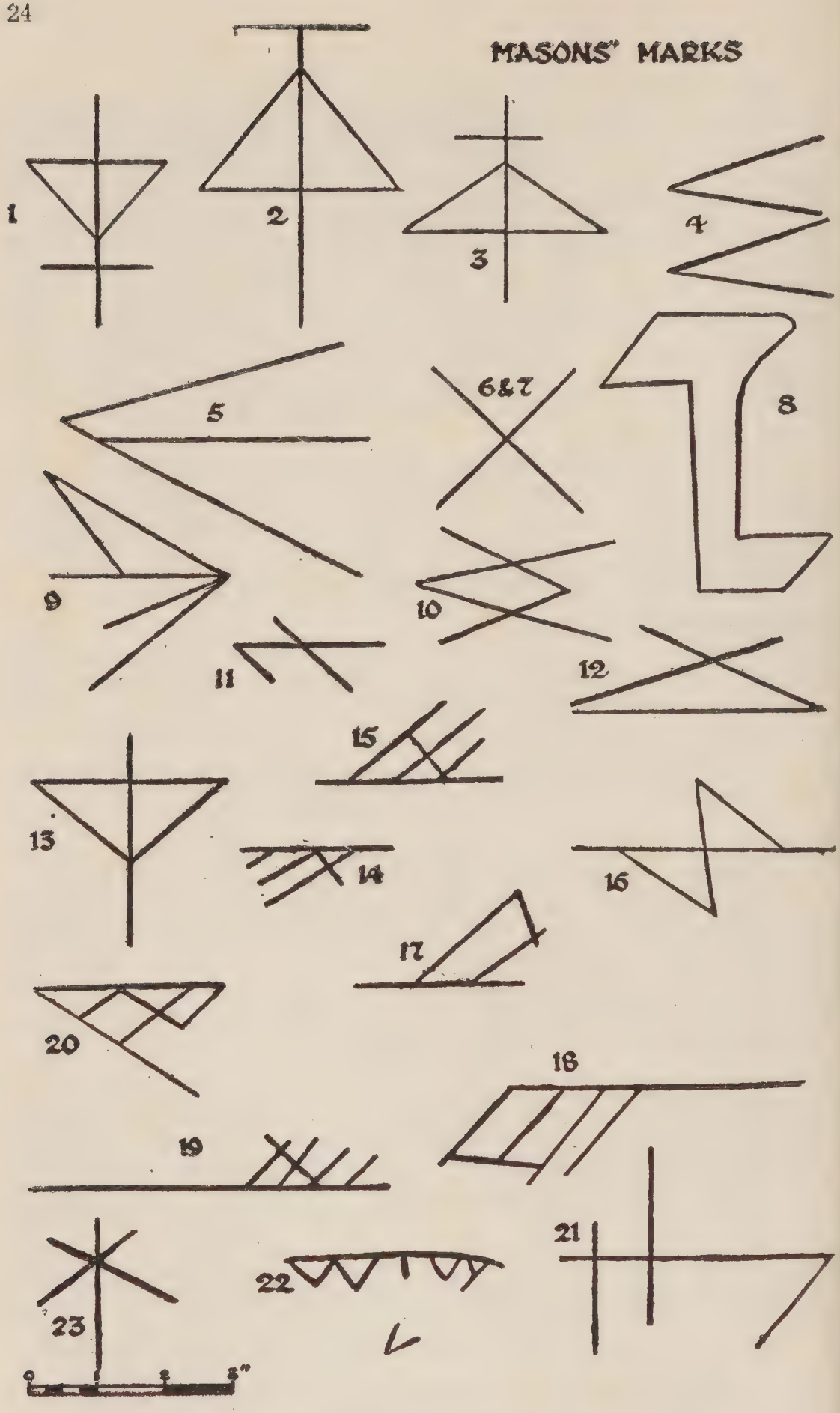


FIG. 7. MASONS' MARKS.

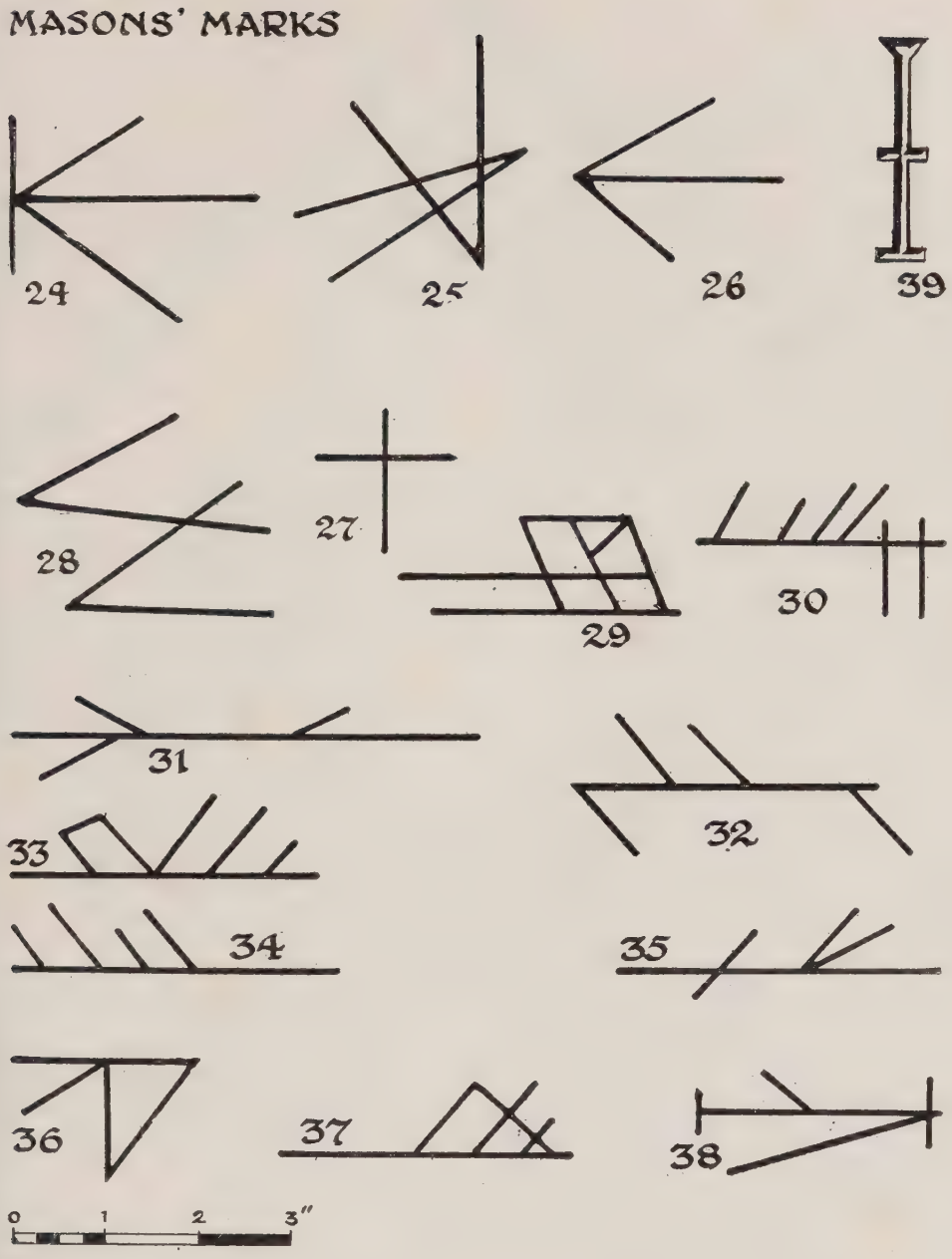


FIG. 8. MASONS' MARKS.

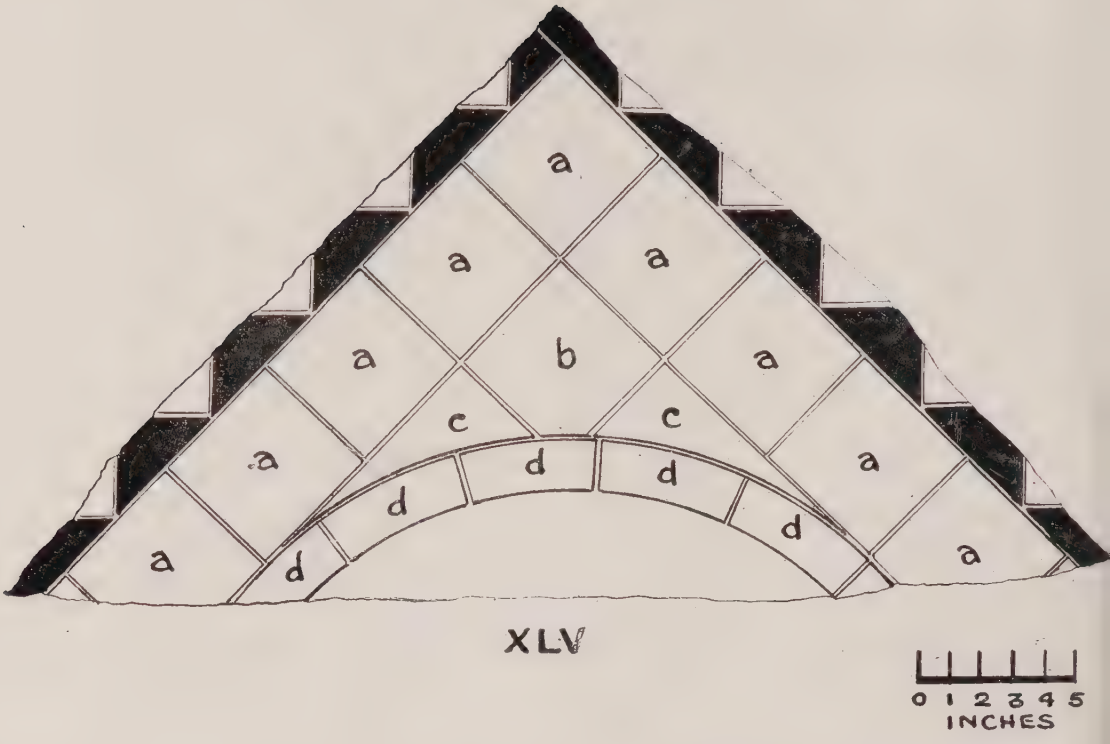


FIG. 9. TILE PATTERNS continued.

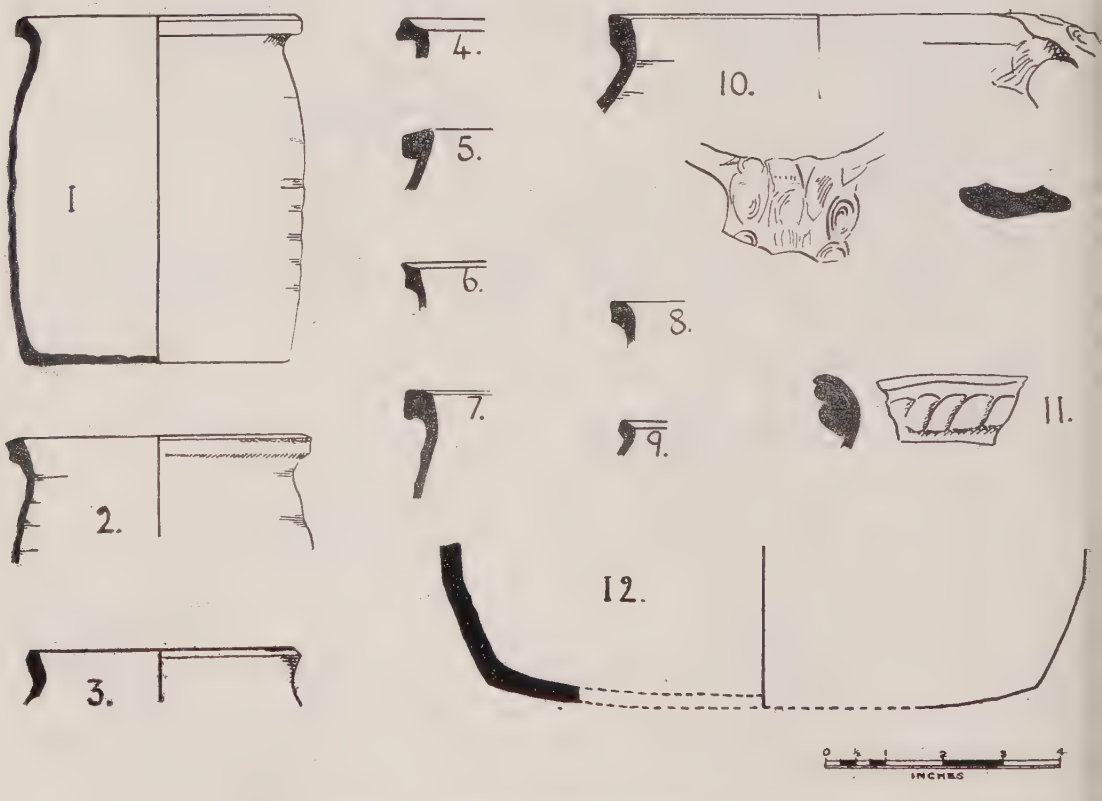


FIG. 10. POTTERY FROM REFECTORY AND BATH DRAINS.

PLATE III

JUG FROM OUTSIDE MEAT-KITCHEN, PROBABLY SIXTEENTH CENTURY.

Kirkstall Abbey Excavations

7th REPORT 1956

by DAVID E. OWEN, Ph.D., F.M.A., F.G.S.

1. INTRODUCTION

THE Kirkstall Abbey excavations of 1956 were planned, as in several previous years, to explore rooms where there was some evidence of floors and to trace structures known to lie beneath the ground. In 1955, a small trench had been dug in the abbot's house at a point in line with two sections of the main drain. The results suggested that the whole room was worth digging, despite the fact that a large tree had been removed from it in the clearing of the ruins some sixty years previously. Therefore it was decided to dig the abbot's house in four rectangular trenches, leaving baulks at right angles across the room. Also in 1955, a small outlet drain had been traced from the bath adjoining the warming house and uncovered on the north side of the meat-kitchen. The meat kitchen floor had been seen in 1952, though it was known to be disturbed and damaged. Two further trenches were therefore put down to trace the drain, and it became immediately apparent that the whole room was worth clearing, and later that an area of the heavy cobble floor was worth re-laying.

The small bath drain was then sought to the south-west of the meat-kitchen. The small trenches in which it was recorded also exposed other wall foundations, and an extensive area both south and south west of the meat-kitchen was uncovered. This report deals largely with the buildings in these areas, which are not yet completely uncovered. It seems likely that more seasons of field work will be needed before their full extent will be known.

Lastly in 1955, there had been an attempt to clear and follow the main drain from the abbey to the river. This work was completed by a series of trenches down to the structure, and by underground exploration. The trenches and the excavations south-west of the meat-kitchen gave in addition some clear evidence of the shape and nature of the land which the monks found on their arrival at Kirkstall in the mid-twelfth century.

The Director of Excavations was Dr. David Owen, assisted by Mr. C. Vincent Bellamy, Mr. C. M. Mitchell and Mr. Maurice Greaves, and Mrs. Jean Le Patourel took charge of the pottery. Dr. Michael L. Ryder made a study of the bones and his report is appended. Each would like to record thanks to an experienced and enthusiastic group of volunteers who made it possible to excavate a large area fully.

2. THE ABBOT'S HOUSE

Before the abbot's house was built, the main drain of the abbey had run uninterrupted from west to east. In the thirteenth century the abbot's house was built above it, a three storey building, the lowest storey too low for a tall man to stand erect. It is possible that a floor was made on ground level, though no traces were found in the excavations, except possibly one just inside the western door where a little mortar was seen. In the fifteenth century a number of rooms was added to the north-east of the abbot's house. At this time the main drain was diverted northwards to pass under a small privy in one of the rooms and from there it describes a curve and rejoins the main drain farther east. For a few feet, the lower course of the old drain appears to have been unroofed and filled in with soil. There is a small cross drain south from the new branch to the old to keep it flushed as it received the waste from the small kitchen east of the abbot's house. No good floor level of fifteenth-century date could be made out. It seems likely from this and from the lowness of the ceiling that the room was used for storage only. A number of floor tiles similar in design to those in the refectory was recovered, but none was in place. There had been considerable disturbances in the 1890s when the huge elm tree had been removed.

In the south-east corner of the room, two trenches occurred. The more westerly contained a modern drainpipe which ran south from the main drain at the point where it was diverted north-eastwards. The more easterly contained a small medieval soak-away drain which sloped northwards to the extension of the old main drain. This lay under the south doorway of the room but was here disturbed and destroyed by the modern drain cutting obliquely across it. It was not found farther to the south. It seems likely that it was built to carry away water from the penthouse roof, which is believed to have flanked the south wall of the abbot's house.

3. THE MAIN DRAIN

The main drain of the abbey received its waters from a hill-side stream which came down from the north-west. This stream ran in a large stone drain beneath the guest house and entered a sluice. At this point one branch ran straight down to the river. The other ran eastwards through the lay brothers' rere-dorter, south of the kitchen, under the frater, under the north-east corner of the meat-kitchen, through the monks' reredorter, under the abbot's house, where the diversion described above occurred, and under the older building to the east. Thence its course was not known, though it was seen to continue beneath the ground.

At the point where it disappears, the passage was cleared. It was traced by crawling for thirty-eight feet to a point where the diversion north of the abbot's house returned. At forty feet it turned ten degrees to the south and continued straight to eighty-three feet six inches. At this angle a trench was put down into it, and a considerable quantity of detritus was taken out and sifted. The stonework of the drain itself was laid in hard glacial gravel. At eighty-three feet six inches it turned seventy degrees farther south towards the river. Ten feet from this angle it was found to be silted up. As the angle was directly beneath a modern asphalt path, a trench was put down to the south. The ashlar stonework of the sides of the drain was found, but the coping stones had gone. The drain was sloping steeply. It was constructed in brown river mud at this point. Two further trenches were opened up between this point and the river, and the floor of the drain was seen in both. The roof was missing, and the ashlar walls had fallen outwards. In both sections the drain had been laid in brown river mud. One last trench was cut on the river bank under most difficult conditions owing to the soft mud and the fact that most of the trench was below river level. At a depth of nine feet, large flagstones were found which were undoubtedly the drain floor. No sides or top were seen in place though large stones did occur. The Leeds Underwater Swimming Club confirmed the presence of masonry below water level in the river bank.

The main drain runs nearly level until it turns sharply, dropping only one foot in eighty-three feet six inches. From this point to the river however, it falls much more steeply, dropping ten feet in the next ninety-six feet. The fall is fairly even though it is difficult to measure in many sections for the stonework has been so much disturbed. In two sections however it can be seen to fall five inches in four feet at a gradient of one in ten.

If the river dam, shown on maps of 1711 were not of monastic origin, the river would have been many feet lower and the drain would have emptied above water level. Throughout its length where whole, the drain had internal measurements of two feet six inches width and one foot ten inches height.

4. THE MEAT-KITCHEN

A few inches beneath the soil, the meat kitchen was floored with a well laid layer of massive rectangular stone setts. On the south side extending some thirteen feet eastwards from the west wall was a long curb which bounded the stone floor. This curb was five feet north of the south wall. Opposite the wide western doorway of the south wall the curb showed considerable wear. It seemed probable that a wooden flight of stairs rose steeply to an upper floor beyond this curb. North of this curb

and along much of the south of the room, flagstones replaced stone setts. The setts themselves were very like the ashlar of the building and laid with them in places were pieces of carved limestone very like the capitals of the cloister arcading. Thus the whole floor appears to consist of re-used material. Beneath the stonework was packed rubble, one piece of which was a fragment of a broken millstone. The importance of this particular stone was realised later, when a second piece was found in a different place. Other finds within the make-up included a casting counter, two lead weights, and a quantity of pottery.

Towards the eastern end of the south side of the meat kitchen was a hearth built of flagstones set on their sides and reddened with heat. A second much smaller hearth occurred in the middle of the floor on the western side of the room. The two great fireplaces were built into the west and north sides of the room.

Beneath the south eastern hearth and between it and the east wall was a small area of mortar floor. On the north it ran up, as though laid against an east to west wall. Such a wall would have been a direct continuation of the south wall of the twelfth-century passage which lies to the east. The mortar floor terminates at, and is not cut by east and south walls of the meat kitchen in the south-east corner. This area then appears to have been a small storage cupboard.

Beneath the floor, running obliquely across the room and turning slightly in its course, occurred the bath drain trench. Within this trench was found a short-cross halfpenny of Richard I. In construction the drain was the same as in the courtyard to the north—flag floor, flag sides and top internally five inches broad and deep.

In the north-eastern part of the meat-kitchen beneath the cobble floor was a length of wall running approximately east and west but not parallel to the walls of the building. This was heavily robbed in places and was missing entirely over the bath drain trench but usually showed both footings and the lowermost course. A small area of burnt reddened clay lay on the south side of this wall and rested upon its footings. This wall may have predated the bath drain trench though no evidence of its age was uncovered.

It had been noted that the bath drain remains almost level for the first fifty feet, dropping no more than an inch or two. It then falls much more steeply in the next twelve feet, where it runs under the main drain, and is twelve inches below the bath floor at sixty-two feet. It falls another three inches across the meat-kitchen floor to a point eighty-nine feet from the bath. Thence it falls again more steeply five inches in the next nine feet and eight inches in a further twelve feet. When last seen one hundred and ten feet from the bath, it is twenty-eight inches below the floor of the bath.

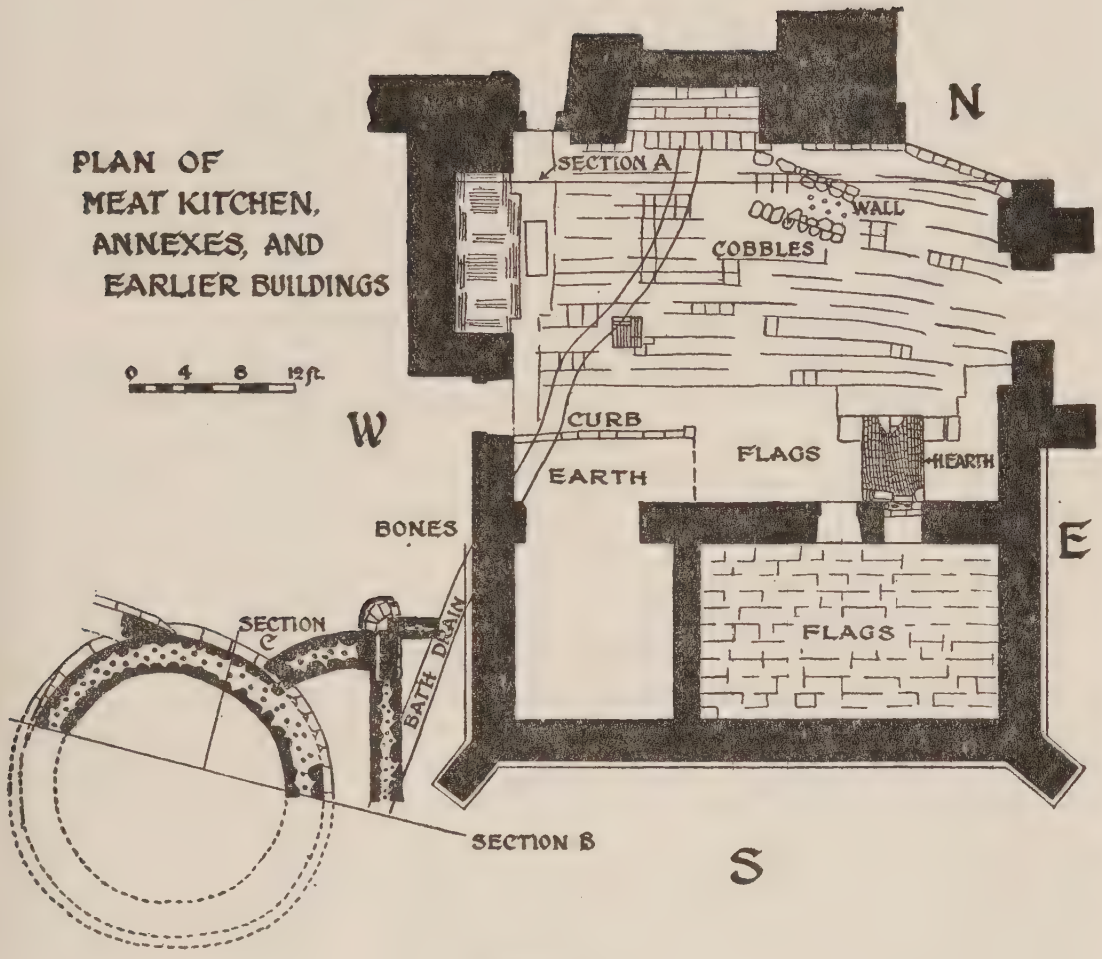

PLAN OF
MEAT KITCHEN,
ANNEXES, AND
EARLIER BUILDINGS
0 4 8 12ft.
N
W
E
S
SECTION A
WALL
COBBLES
CURB
EARTH
FLAGS
HEARTH
BONES
FLAGS
SECTION C
BATH DRAIN
SECTION B

FIG 11

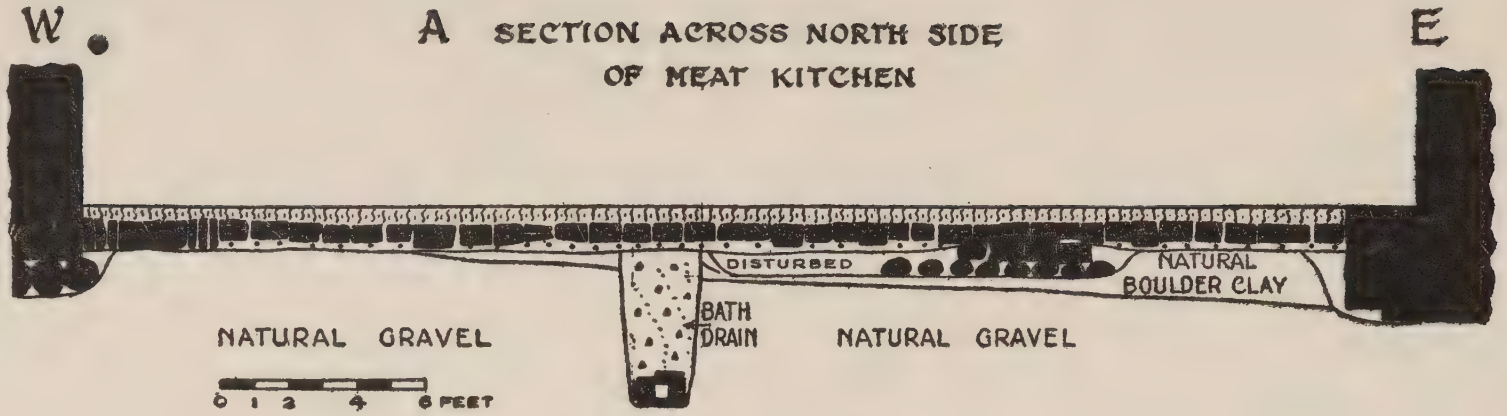
5. MEAT-KITCHEN ANNEXE

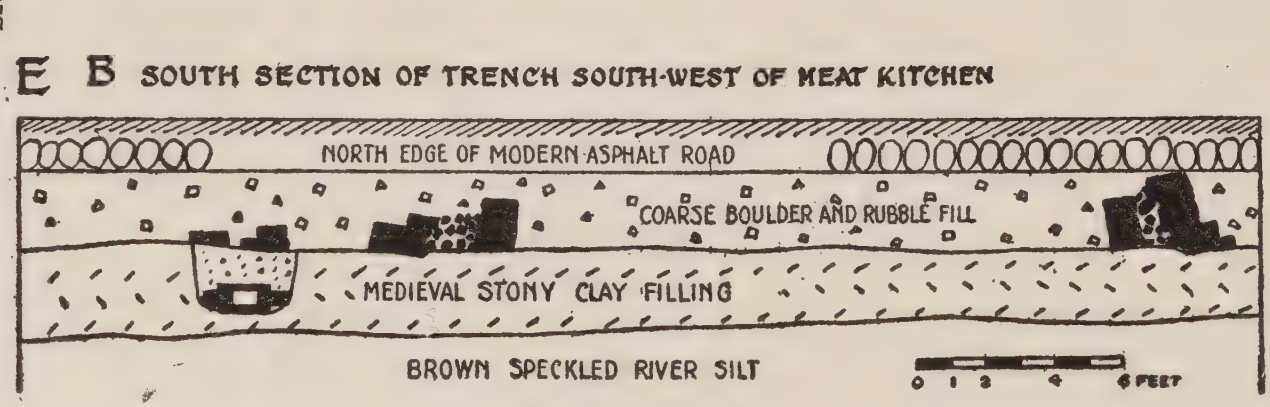
The east and west walls of the meat-kitchen are seen to continue southwards a few feet. An old print of 1723 shows a complete building standing with a curved south wall and corner buttresses. Trial trenches were put across these walls to follow their outline. The south wall was found to be straight and parallel to the north wall and to contain no curve. It is however still possible that traces of a curved wall may be found yet farther south, and this will be sought at a future dig. The buttresses were visible but seemed much larger than those shown on the drawing. This annexe, thirteen feet across, was divided into two rooms, an eastern flagged and a western with a floor of beaten soil. A small sand-filled drain ran across the north side of the western room and passed through the western wall footings. From there it appears to have swung southwards.

6. BUILDINGS SOUTH-WEST OF MEAT-KITCHEN

Against the western wall of the meat-kitchen was an extensive dump of animal bones. The study of these by Dr. Michael Ryder forms part of this report. Amongst the bones were many sherds of pottery. The bath drain ran below the bone layer and continued south-westwards. Thence it passed below a north to south wall. This wall had foundations of a lower level than the meat-kitchen annexe wall. Adjoining the north end of this wall was another at right angles, extending a short distance to the east. Here it stopped, probably removed when the meat-kitchen annexe wall was built. Two stones in the foundation of the latter wall were directly in line with the west to east wall and may mark its course. In addition there was a small curved wall which ran west and through which passed a flagged drain. This wall was butted on to a remarkable semi-circular building. Unfortunately the asphalt road bounds the south of this area and covers the other half of this building, but there is reasonable evidence to indicate that the building was completely circular. It is seventeen feet three inches across internally and twenty-two feet nine inches externally at the level of the offset course. The three-foot-thick wall slopes inwards at an angle of about ten degrees. The building has no properly laid floor and, in the area uncovered, there was no sign of a hearth. Most of the building was no higher than the offset course and there was therefore no doorway.

Against the north-western side of this building another curved wall butted. This was traced for four feet and will be followed further in future. Within and outside these walls was a large quantity of rubble and amongst this was a single fragment of a millstone. This fragment exactly fitted that from beneath the meat-kitchen floor. It seems certain that these buildings were taken down at the time the meat-kitchen was built. The ashlar was probably re-used and the rubble merely





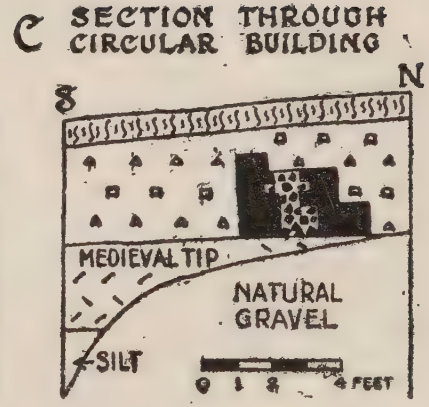


FIG. 12. SECTIONS.

scattered. Some of this rubble was used as a foundation for the meat-kitchen floor. Thus it is clear that these buildings were constructed after the bath drain, but were taken down again to make way for the meat-kitchen and its annexe.

The pocket of bones against the meat-kitchen wall is not sealed. These bones occur in less quantity around the ruins of the circular building and other walls. Thus a picture of this area in late fifteenth and early sixteenth centuries would probably have shown the meat-kitchen flanked westwards by stony hollows and mounds amongst which the bones were tipped. There are also several fragments of post-monastic pottery. It seems likely however that the dump was mostly monastic, for Red and Fallow deer would hardly have been cooked and eaten on the site in post-monastic times. It is possible, however that sixteenth and seventeenth century farmers may also have made use of these buildings, as is suggested by Mrs. Le Patourel on page 38.

The excavations threw a great deal of light on the river bank in monastic times. Beneath the meat-kitchen the sub-surface is a solid tough glacial gravel with a thin overlay of boulder clay on the north side. The foundations of the curved building however stand upon medieval "made ground" which rests to a depth of two or three feet on a soft brown river mud. It has always been a puzzle that the lowermost floors of the south range of buildings rest directly on boulder clay or gravel and not upon early medieval soil which should have been of considerable thickness. It seems certain however that the river flowed close to the present south range and that solid ground was extended southwards by clearing off all the soil where the main buildings were to be erected. The older plans showing the positions and shapes of the monastic fishponds, suggest that those ponds once formed a branch of the old course of the river and that they were sealed off by the dumping of soil. It is likely that the river occupied both channels and that it was flanked by marshy ground. Thus the fishponds were easily constructed from the northern branch. This arm must have turned south to the main stream west of the main drain which is laid the whole way across.

7. MISCELLANEOUS FINDS OTHER THAN POTTERY AND BONES

Coins A short-cross cut halfpenny of Richard I., Class IIb. 1190-94. *Obv.* Crowned head facing with sceptre HENR(ICVSR)EX. *Rev.* Short cross with cross in each segment. (WILLE)LM ON LVN(DEN).[1] Coin found in drain trench in meat kitchen.

Casting Counter (very corroded). Burgundian or Netherlands? Philip the Fair or Charles V (c.1490-1520). *Obv.* Arms of Burgundy for Brabant, Flanders, etc. Resembling F. P.

[1] For classes of short-cross coins see *The Shortcross Coinage 1180—1247,* by L. A. Lawrence (British Numismatic Journal, XI 1915).

Barnard pl.xxiii 7(obv.). Inscription looks like BO(L)D(W)INE --DOMVS-----S--EVER+. *Rev.* Design worn but perhaps a floreated cross with shields in angles resembling F. P. Barnard pl.xxiii 3(obv.). Inscription looks like BVENVO +BVENON DEVS NOBISVE. For help with this difficult piece, we are grateful to Mr. A. Thompson, Ashmolean Museum, Oxford.

Iron All objects deeply corroded. Numerous nails from all levels. The handle of a key unstratified in the meat-kitchen. A two-inch piece of haematite, wedge-shaped, shows undoubted signs of polishing on three surfaces. This was sealed by the meat-kitchen cobble floor.

Copper and Bronze Numerous fragments occurred at all levels. Beneath the meat-kitchen cobble floor occurred a bronze letter N (fig. 14). Also beneath the same floor were two small links from a bronze chain (fig. 14). South-west of the meat-kitchen, associated with the rubble adjoining the walls, but unsealed, were a bronze pin or loop of bronze wire, three inches long, and a broken piece of bronze belt buckle. Unstratified, south-west of the meat-kitchen were hand-made square section copper nails one inch long.

Lead Flashing and window strips were numerous at all levels. Beneath the meat-kitchen cobble floor were two lead weights, the one circular and 8.01 ounces avoirdupois—probably a half pound weight, and the other 1.20 ounces. The lighter one was made for suspending on a bar (fig. 14).

Glass There was a lot of fragmentary glass in the upper levels, most of it in such small fragments and so devitrified that it was beyond preservation. South-west of the meat-kitchen, however, were three fragments of opaque devitrified glass with red painted lines (fig. 14). From inside the abbot's house, in unsealed layers, were fragments of devitrified green and blue glass and a thin piece, colourless. The quantity of window leading suggests that all is window glass torn out at the Dissolution. Just south of the abbot's house, also unsealed, was the base of a small bottle, completely devitrified (fig. 14).

Stone Flints were much less common but lay as before beneath monastic layers.

Shells Oysters (*Ostrea edulis*) and cockles (*Cardium edule*) occurred beneath the meat kitchen floor; and oysters, cockles, mussels (*Mytilus edulis*) and whelks (*Buccinum undatum*) occurred associated with bones west of the meat-kitchen.

Tiles (Described by C. Vincent Bellamy, B.Sc.)

A few fragments of tiles were found amongst the general filling above the foundations of the round building, and in the abbot's house. Most of them were of patterns seen in the refectory and described in the Sixth Report.

Two new patterns were found, however, and are illustrated (fig. 14 xlvi and xlvii). Both specimens were unstratified.

xlvi Portion of a tile, apparently four-and-a-half inches square and one inch thick. It closely resembles the refectory tiles in texture and workmanship and is likely to be of the same date. Pattern in blue against a background of white slip inlay. Inlay about 0.02″. No glaze remains on the face of the tile, but traces of transparent yellow lead glaze are seen on the edges. Body of tile yellowish-brown with grey core.

xlvii Almost complete tile three and three-eighths inches square and one inch thick with much of surface flaked off. Reddish-brown body with pattern of white slip inlay. Background of pattern normal body colour, with transparent yellow lead glaze. Inlay about 0.02″ thick. Date probably the same as the refectory tiles.

THE POTTERY (by H. E. Jean Le Patourel, B.A.)

The pottery found this year may conveniently be considered in two groups. First, that found beneath the meat-kitchen floor, and second, a considerable quantity found during the excavation of the area lying to the south-west of the meat-kitchen. The excavation in the abbot's lodging need not be taken into consideration since no stratification was observed there and only one piece of pot (fig 13, No. 6) was of sufficient intrinsic interest to require illustration. Of the two groups the first comprised a rather heterogeneous collection of such sherds as chanced to be included in the material used for levelling-up prior to laying the meat-kitchen floor. Its importance lay in the fact that it was a sealed deposit of pottery none of which could be of a date later than the end of the fifteenth century, and in that it provided a comparison with the pottery of the second group. This latter, from the excavation to the south-west of the meat kitchen, though it contained a small proportion of early sherds (not more than 6% for the twelfth and thirteenth centuries) and a still smaller proportion of post-monastic sherds (under 4%), consisted in the main of a fairly homogeneous collection of pottery of sixteenth-century or later date.

Much of the original floor of the late fifteenth-century meat-kitchen was unbroken. Under it were just over 350 pieces of pottery, all earlier than, or at latest contemporary with the building of the kitchen. The pieces were mostly small and it is not always possible to date them accurately. A rough analysis suggests that a minimum of 8% of the total dated from the twelfth or early thirteenth century; a further 8% were of late fifteenth-century date; the remaining 84% covered the period from the mid-thirteenth to the mid-fifteenth centuries. The very high proportion of pots of which only one fragment remained (the 350 sherds representing at least 300 pots) and the long period of time covered by the sherds suggests that they were the chance contents of a "fill" brought from elsewhere during the construction of the kitchen. That pottery could in fact make

its way round the Abbey in this manner was demonstrated by a highly distinctive Norman-French pot, two pieces of which came from beneath this floor. One of these pieces joined to a sherd found outside the old kitchen in 1950[1] and two further pieces of the same pot came to light outside the sub-dorter in 1951.

The normal fabric of Kirkstall pottery consists of clay with a generous backing of grit. This was certainly of local make; it is found in the country-side around Leeds and it developed directly from twelfth-century ware and continued in unbroken tradition down to the sixteenth century and possibly beyond. But from the fourteenth century or even earlier, a fine smooth fabric is occasionally found. Examples of this ware found so far have all been jugs, superior in form and technique to those made in the gritty fabric. 7% of the pottery from below the meat-kitchen floor was of this type, including the fourteenth-century jug fragment illustrated (fig. 13, No. 4). There were a few fifteenth-century fragments within this percentage. Several indications suggest that this smooth ware may have been imported from York. A finger-pressed base (fig. 13, No. 5) and part of a tubular-spouted jug[2] found outside the kitchen are both types made in York at the end of the thirteenth and beginning of the fourteenth centuries. Furthermore the green glaze found most frequently at York is a bluer green than the normal Kirkstall glaze, and when the former is found at Kirkstall it is always on a fabric of this fine smooth type. The green glaze found on gritty ware at Kirkstall is of a brownish or yellowish tinge. From the late fifteenth century onwards a considerable amount of smooth, grey, hard fabric is found at Kirkstall as on all northern English sites. Whether this is a development of the York ware, or stems from yet another tradition, is not clear. It is certain, however, that at Kirkstall it never ousted the earlier gritty ware.

The relative proportions of green and brown glaze in the two groups also call for comment. From at least as early as the thirteenth century a clear brown glaze is occasionally found at the Abbey; this was obtained by using a plain galena glaze over red (oxidised) surfaces, which produced a warm mid-brown tone. Dark brown manganese glaze seems to have been unknown to local potters before the fifteenth century. In the meat-kitchen only 12% of the glazed sherds, and all these of late type, were dark brown. Moreover the thin, patchy nature of this glaze when it occurs, suggests that its use at this time was experimental.

[1] *Kirkstall Abbey Excavations, 1950—1954* (Publications, Thoresby Soc., XLIII, 1955), p. xv and fig. 4 (p. 11).

[2] T. C. M. Brewster, *Two Medieval Habitation Sites in the Vale of Pickering* (Yorkshire Museum, 1952), Fig. X (p. 33). For distribution of these jugs, see M. M. Rix and G. C. Dunning, "Excavation of a Medieval Garderobe in Snargate Street, Dover, in 1945"; *Archaeologia Cantiana*, LXIX (1955), p. 144, and map by E. M. Jope in R. Hogg, "Excavations in Carlisle, 1953"; *Transactions*, Cumberland and Westmorland Antiquarian and Archaeological Society, N.S. LV (1956), p. 78.

On the pottery from the excavation outside the meat kitchen the proportion of manganese glaze increased to 60% of the total, and its quality showed considerable technical improvement, approximating, at its best, to the rich brown lustre of Cistercian ware. Green glaze continued to be used at Kirkstall to the end of monastic times and beyond, but its popularity was eclipsed by that of brown.

The excavation to the south-west of the meat kitchen produced a considerable amount of pottery, nearly 1,100 fragments in all. Among these was a small proportion (about 6%) of twelfth and thirteenth-century sherds, all small, and for the most part each representing a different pot. There was also a small proportion of fourteenth-century material, of which the tubular-spouted jug (fig. 13, No. 3) is an example. The great bulk of this pottery, however, consisted of jugs, large pitchers and cisterns, some with bung-holes, some with two or more handles, forming a homogeneous group all certainly later in date than the latest fragments in the meat-kitchen. Only two of these are illustrated this year (fig. 13, Nos. 1 and 2) since it is hoped that continued work in the same area next season may complete the section of a number of others.

These pots are not earlier in date than the middle of the fifteenth century. Typologically they could belong to the early sixteenth century, but some of them would not be out of place a century later. The closest comparison is with the pottery from the cloister cistern,[3] and there again it is not possible to preclude a post-monastic deposit. The group under consideration was not sealed in any way, and included between thirty and forty small sherds unlikely to be of earlier date than the seventeenth century. It is always difficult to assess the duration of any type of pottery, but it is known that the smooth grey ware of which about 30% of these sherds were composed, was in use right down to the time of the Civil war.[4]

On general grounds one would suppose that so large a deposit of pottery could only accumulate before the Dissolution; but in fact it is known that parts, at least, of the monastic buildings were in use long after that. Ralph Thoresby, writing of Kirkstall in 1715, says: "The Roof has been off the Church ever since the Dissolution of the House; but the Dortoir, or Dormitory, and some other Places that have been converted to private Uses, are covered."[5] His engraving of the Abbey shows that the lay brothers' quarters at the western end of the cloister were also roofed and apparently in good repair. After the Dissolution the chief value of the Church lay in its lead roof; the domestic buildings with their less valuable roofs of tile might more profitably be used for other purposes. Until the character and

[3] *Kirkstall Abbey Excavations*, pp. 64-5.
[4] *Ibid*, p. 22.
[5] *Ducatus Leodiensis* (1715), p. 165.

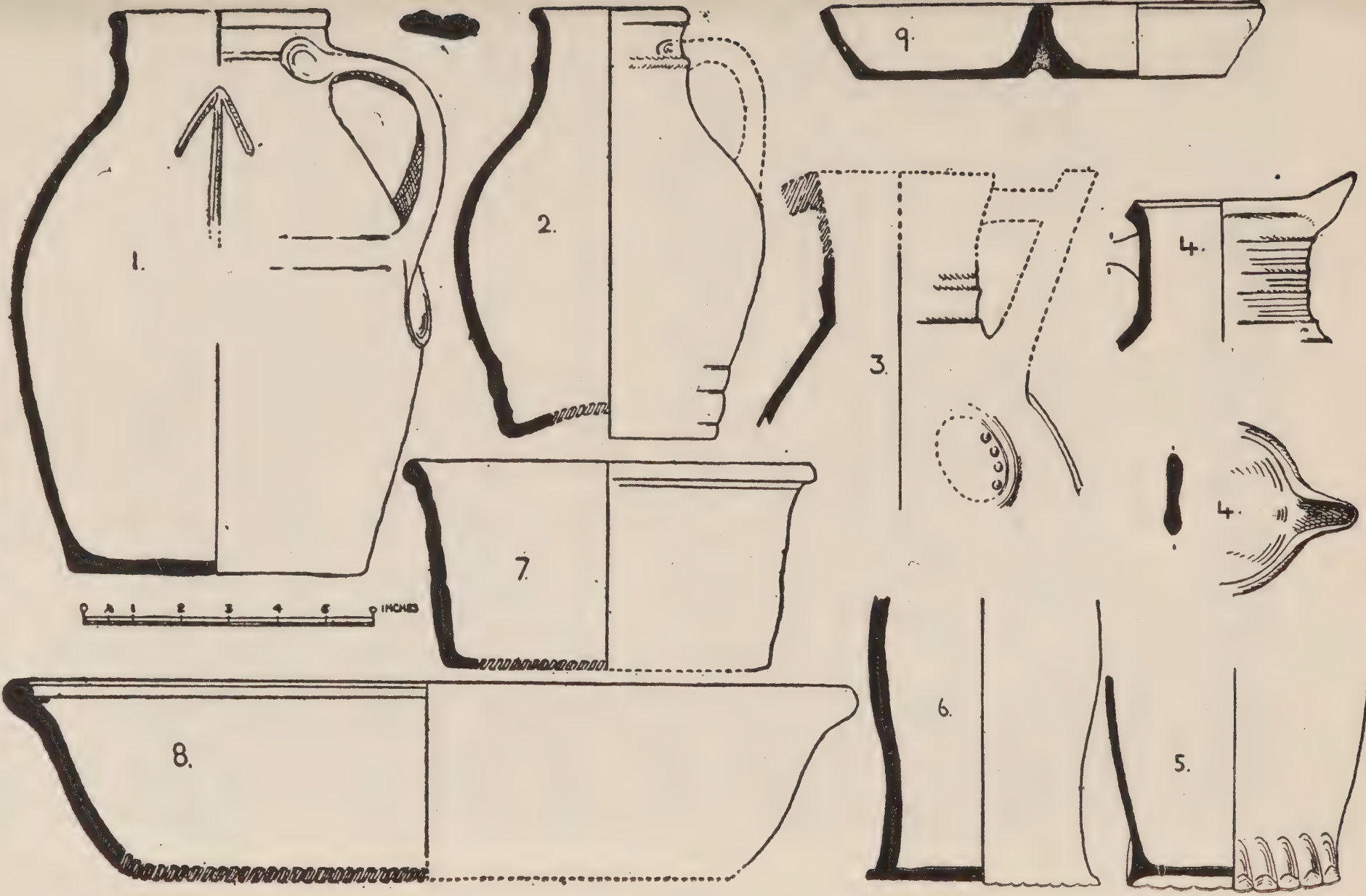


FIG. 13. POTTERY. SCALE ¼.

duration of post-monastic habitation of the buildings has been ascertained, it is necessary to keep an open mind on the dating of pottery where positive proof of monastic origin is not forthcoming.

DESCRIPTION

1. Jug in slightly gritty grey ware with brown glaze over upper external surface. On one side of the jug is an arrow in applied clay. From outside meat-kitchen. Probably sixteenth century.

2. Small jug similar to above. In both cases the glaze is ornamental rather than utilitarian since the rim is unglazed. From outside meat-kitchen. Probably sixteenth century.

3. Part of jug in smooth buff fabric with tubular spout. It is decorated with applied cordons and circular pads of clay stamped with a pattern of which very little survives. It is glazed in alternate panels of yellow and green. York type; thirteenth-fourteenth century. From outside meat-kitchen.

4. Neck and rim of jug in smooth buff ware with greenish brown glaze. The raised lip and sharply marked neck show the influence of metal ewers. From below meat-kitchen floor; probably fourteenth century.

5. Base of jug with fingerprint decoration. Smooth buff ware with a drop of dark green glaze. Probably from York. Fourteenth century.

6. Splayed base of grey gritty ware with partial brownish-green glaze on external surface. Compare this with 5 for thickness and evenness of section. From abbot's lodging; probably late fourteenth century.

7. Small bowl in pink gritty ware, partially glazed internally with brownish green glaze. From meat-kitchen; thirteenth century.

8. Large open bowl. Grey gritty ware with internal brownish-green glaze. From meat-kitchen; thirteenth century.

9. Double dish in rather gritty hard pinkish fabric. The internal surface is entirely covered with mid-brown glaze. The base is roughly trimmed with a knife. From outside meat kitchen; probably sixteenth century. Similar shaped double dishes have been found at Rievaulx and at York.

REPORT ON THE ANIMAL BONES

by Michael L. Ryder, Ph.D., M.Sc., M.I.Biol.

INTRODUCTION

Most of the previous digs at Kirkstall[1] have yielded animal bones, but the number of finds was so great this year that it was possible to gain more information from them than in previous years.

During the first dig in 1950, south of the main kitchen, bones of rat, dog, ox, sheep and horse were found. In 1951 animal finds were much less plentiful, but bones of ox, sheep, pig and horse were found in the courtyard south of the warming house. Bones were more numerous in 1952, particularly in and near the meat-kitchen. They included ox, sheep, pig, possibly Red deer, and horse. There were numerous heads of femora of either ox or horse, chopped off perhaps to allow the marrow to stew out. In addition, two pieces of shaped bone, possibly tools, were uncovered. In 1955[2] molars of pig and sheep occurred in the make-up of the mortar floor; ox incisors were found, and beneath the mortar floor levels, the bones and teeth of an old horse were found buried in a small trench. There were large fish vertebrae possibly from salmon in the make-up of the tile floor.

THE FINDS OF 1956

Hundreds of incomplete bones and bone fragments were found, nearly all of which came from two trenches near the meat kitchen. Both of these had initially been dug to trace the bath drain, and the first was adjacent to the west wall of the meat kitchen. The other was begun some 20 feet south of this, but as described elsewhere, was later considerably enlarged until it met the first. Each trench had a similar filling of rubbish, mixed with soil and stones and including much pottery, among which the bones were found. This was not in fact a rubbish dump, but the rubbish had at some time been moved to this spot—possibly in levelling the ground. However, the large number of bones, and their nearness to the meat-kitchen strongly suggests that these were kitchen waste. The animal finds of previous years were most likely incidental, and might even have represented animal burial (horse 1955).

It was not possible to date the bones (from the pottery) more closely than the fifteenth century (the date when the meat kitchen was built) to 1540 (the date of the Dissolution) or possibly to post-monastic times. Although it is true that these bones were not sealed, they were found at depths of up to 4-5 feet with much monastic pottery and it is probable that they were

[1] *Kirkstall Abbey Excavations, 1950—54* (Publications of the Thoresby Society, XLIII, 1955).
[2] *Kirkstall Abbey Excavations, Sixth Report* (1956).

mostly of monastic origin. Had the bones been from a period after the Dissolution, deer bones would have been most unlikely even from say a 17th or 18th century farmhouse site.

Nearly all the bones had been chopped, so that with limb bones, for instance, it was usually the ends that were found; there were hardly any complete bones. A number of the bones had iron or copper stains, presumably caused by the proximity of these metals in the soil. During the main dig in July, the bones were so overwhelmingly numerous that only what was considered to be an adequate sample was kept. During both the dig and the subsequent examination of the bones, an attempt was made to estimate the frequency of the different bones of the body found, and of the different species present. Estimates were made of the ages at which the animals had been killed, and the way in which they could be related to present-day animals was examined.

Later it was realised that the original sample was probably biased because only good specimens and not every bone had been saved. In order to remedy this, and at the suggestion of Dr. Owen, another dig was carried out, which was kindly undertaken by Mr. Frank Rigg. A cubic yard of earth adjacent to the original trench, west of the meat-kitchen was excavated and this will subsequently be referred to as the second dig. This time *every* bone and bone fragment was kept.

RESULTS OF THE EXAMINATION OF THE FINDS

1. Species Found

Bones were found of ox, probably two breeds of sheep, goat, pig, Red deer (*Cervus elaphus*), Roe deer (*Capreolus capreolus*), Fallow deer (*Dama dama*), and rabbit. Only the last four of these would certainly be wild; it would be extremely difficult to distinguish wild from domestic pigs from the skeleton.

There was a humerus and a tibia from the domestic fowl and a humerus and cervical vertabra from a smaller bird, possibly pigeon, rook or jackdaw. A radius and the fused metacarpals of a much larger bird were found; these were possibly from goose. In addition to these there are several other bones, from small mammals or birds, found in the second dig, which have yet to be identified.

There were eight large fish vertebrae. Two of these had diameters of 12 and 13 mm., and the diameters of the others ranged from 16 to 20 mm., with a mean of 18 mm. Both these groups of vertebrae could have come from the same kind of fish, but the larger ones seem to be too large to be from fresh water fish, and are probably from sea fish, possibly cod. In addition, two proximal ends of branchiostegal rays from a fish of cod size were found.

2. The Different Bones Found

The different bones found were present in varying frequencies and the bones will be detailed below in order of decreasing numbers as estimated at the time of the first dig. The frequencies are indicated too, in Table I, although, except for deer and pig, these are probably inaccurate. The second dig provided a more accurate estimate of the frequencies of bones found and these are shown in Table III.

In the first dig but apparently not in the second, the most common bones were the cannon bones of ox (Plate IV(b)) i.e. the fused 3rd and 4th metapodia of the feet, the distal (lower) end being the familiar knuckle bone. There were a few cannon bones from deer, but apparently none from sheep. In the second dig, two pig metapodia were found (these are not fused in the pig).

The next most common bones seemed to be mandibles (lower jaws) of ox, sheep and pig. Most of the jaws contained molars, but had had their anterior, and many of their posterior ends removed—some with a neat cut, whereas long bones had usually splintered and left a jagged edge. There were parts of maxillae (upper jaws), too, containing molars, and many teeth were found free in the soil. These were mainly molars of ox and sheep, probably from broken upper jaws, but some incisors were found, including some of pig, as well as some pig canines.

Following these in frequency were the ends of longbones, mainly from ox, with a few from sheep. There were a few heads of femora, presumably from ox, and a few shafts of ox femora and humeri, minus their ends. Apparently, however most of the shafts of longbones had disintegrated after their ends had been removed, and many bone splinters were found; in the second dig the number of splinters that were obviously from longbones was recorded.

Then there were scapulae (shoulder blades) of ox and sheep, and bones from the pelvic girdle. In smaller numbers were the ribs (more numerous in the second dig) and vertebrae from ox and sheep; even these had been chopped and dorsal spines of vertebrae were found free.

Finally there were a few upper parts of skulls, viz. one of goat, one of a young horned sheep, and one of an adult hornless sheep (found two feet below the surface) (Plate IV(a)). There were two other frontal bones from sheep with the bases of horn cores, and three horn cores were found free; these were all sharply curved, and roughly triangular in cross-section, therefore being certainly from sheep. The upper parts of the skulls from a horned and a hornless sheep, were found during the second dig at a depth of three feet. The only certain portions of ox skulls were posterior ventral parts, and thus no evidence was found to show whether the cattle were horned or not. The Chronicles of Meaux Abbey[3] mention horned cattle. No antlers were found.

[3] *Chronica Monasterii de Melsa,* III (Rolls Series 43, 1868), xvii.

3. The Relative Numbers of the Different Species

It was obvious during the dig that there were far more bones from ox than any other animal. For example during the first three days' digging of the trench south-west of the meat kitchen, over a hundred distal ends of ox cannon bones were counted (not included in Table I). But there were only a few from deer, and none from sheep. During the same period a sample of jaws included 33 from ox, 10 of sheep and 6 of pig. In addition there were many free ox teeth suggesting that in fact there had been a greater number of ox jaws that had broken either before or during the dig. Table I shows that subsequent "selection" brought the total number of jaws from each species artificially closer together.

During the second dig, carried out solely in order to estimate the numbers of different species, even fewer complete bones were found than in the first. However, as seen in Tables II and III, a great many of the fragments could be identified. Table II shows the numbers of bones found at different levels during the second dig, and except for pig, these changed little with depth; it is interesting that all the pig bones were found at a depth greater than two feet. Because of the fragmentary nature of the bones, and the difficulty of distinguishing whether a bone was from the left or right side of the animal, it was not possible to estimate the numbers of animals represented. The percentages shown in Tables II and III, as in Table I, are thus percentages of bones and not of animals. But it is thought that sufficient bones were identified and counted (over 800) to give a reasonable estimate of the proportions of animals present. In fact the percentages in Table III from the second dig compare well with those in Table I from the first. The results obtained suggest that ox bones were nearly ten times more plentiful than sheep bones, and that the bones of other animals were present in quite small numbers, the relative proportions of which, as shown in the tables are probably less accurate.

These proportions are of course the proportions in which the animals were eaten, and cannot indicate the number of the animals kept. For instance, it is obvious that the monks must have had much larger flocks of sheep than herds of cattle. Some figures for 1301 (admittedly, a much earlier date), given in the account of the foundation of the abbey[4], show that the monks then had 618 head of cattle (216 draught oxen, 160 cows, 152 yearlings, and 90 calves) whereas the sheep numbered 4,500—very roughly ten times more than the number of cattle.

4. The Ages at Which the Animals were Killed

Judged from the criterion that in young animals the epiphyses or bone sutures have not yet become fused, the majority of bones were from adult animals. But it was possible to obtain

[4] *Fundacio Abbatie de Kyrkestall* (Publications of the Thoresby Society, IV, 1895), p. 203.

a better idea of the age from the jaws, first from the stage of development of the dentition[5], and secondly from the extent to which the teeth had been worn[6]. There is no evidence that recent improvement of domestic animals has caused the teeth to be erupted earlier[5]. It is, however, possible that gritty pasture or traces of stone in rough ground meal could have accelerated the wear of teeth by present day standards, but this was taken into account when estimating the ages.

Of the six ox lower jaws complete enough to show the dentition, one had only five molars and was therefore from an animal between one and two years old. The rest had a complete set of six molars showing them to be from animals over two years of age, but the teeth were relatively unworn. There were fourteen other parts of jaws with worn teeth, being from animals probably about five years old. Of 105 separate teeth, including only a few incisors, 41 were not very worn, being comparable with those in the two-year-old jaws; 24 were worn being probably from animals about five years old, and 40 were very worn—some almost down to their roots, being from animals probably ten or more years old.

Out of twelve complete lower jaws from sheep, one had the fourth molar just erupting showing it to be from a lamb about six months of age. Another had five molars and was therefore from an animal about a year old. A third had the sixth molar just appearing, thus being from a sheep between eighteen months and two years of age (Plate IV(a)). The remaining nine jaws had a complete set of six molars, and were therefore all from animals over two years old. Of five other parts of jaws, one had a molar erupting, showing it to be from an animal under two, and the others were all from sheep at least two years old. None of the sheep teeth in the jaws, or found free, was very worn, and they thus showed far less wear than those of the ox.

The pig metapodia found had lost their epiphyses (ends) and were therefore from young animals. Of four pig jaws complete enough to show the dentition two had the fifth molar (unworn), and were therefore from animals about a year old; in the other two the sixth molar was just erupting, so that these were from animals about eighteen months of age. Four more parts of jaws were from animals about the same age, and all the teeth found free were relatively unworn.

Finally, all the deer teeth, in the jaws, and found free were relatively unworn, and apparently from fairly young animals.

5. Size, and the Relationship to Present-Day Animals

The scarcity of complete bones meant that few measurements of the length of bones could be made. The measurements of

[5] Brown, G. T., *Dentition as Indicative of the Age of the Animals of the Farm* (1949).
[6] Wallace, R., *Farm Livestock of Great Britain* (1923)

interest that were made are shown in Table IV. Apart from these, and instead of accurate measurement, a number of fragments, mainly from ox, were compared with the same bones in average-sized skeletons of present day animals[7]. Some of the bones were one sixth to one quarter smaller, others were similar in size, and some, viz. the metapodia and phalanges of the feet of the ox were the same size or even larger. In addition the walls of the metapodia were thicker than the present-day bones.

Three of the ox metapodia, although from adult animals were much smaller than the rest, and were at first thought to be from Red deer. This together with the size differences above suggested a breed or even sex difference, the smaller bones being possibly from cows.

Many of the ox metapodia were striking in that they had very broad distal ends, the extra width being in the outer articulating surface (Plate IV(b)). Figures for the total width and the ratio of the width of the inner to the width of the outer articulating surfaces are given in Table IV. No record of this phenomenon elsewhere is known; it does not occur in the modern ox metapodia examined, nor in the illustrations of mesolithic ox metapodia studied[8], neither was it found in sheep or deer metapodia. Thus the cause or function of this distal spread is unknown. Some of the extra width may be formed with age, and it is known that the large joints of young animals often remain relatively large because of mineral deficiencies. But, in suggesting that the extra width is associated with the work done by draught oxen, one must remember that acquired characters cannot be inherited.

Whereas the general impression from the ox bones was that the animals were not much, if any, smaller than the cattle of today, the impression gained from the sheep bones (much fewer in number) was of rather smaller animals. But comparison is difficult because there is considerable difference in size between different breeds of sheep today and, as discussed below, it is thought that two breeds are represented by the bones found, viz. horned and hornless (longwoolled). Although the hornless sheep was apparently bigger then than the horned breed even in monastic times (Plate IV(a) and Table IV) as expected, the hornless type seems to have increased most in size since then. This was no doubt due to the improvement carried out with the longwools in the 18th century. In fact most of the sheep bones found, although longer, were not as wide as the bones of a four month old Romney (hornless) lamb. It is interesting that the lower jaws seemed to be of two sizes (Plate IV(a)) and in Tables I and IV the smaller group of jaws has been tentatively assigned to the horned sheep.

[7] Museum, University of Leeds, Department of Agriculture.
[8] Clark, J. G. D., *Excavations at Starr Carr* (1954).

DISCUSSION

The predominance of feet and jaw bones in the first dig suggested that these bones had merely been cast aside after slaughter. Fowler[9] discusses the lack of slaughterhouses in abbey plans and suggests that animals were killed in a yard near the kitchen. However, these bones, too, had been chopped and had apparently been in the "pot". The bones therefore seem to be kitchen waste, whatever else happened to them afterwards, and thus throw interesting light on the food of the monks.

From the high proportion of ox bones, it seems that the monks ate more beef than any other meat. Certain authorities consider that in Saxon times, the pig was the predominant meat animal, cattle being kept mainly as draught animals. Sheep, although milked, were kept mainly for their wool, and this was particularly so in the middle ages when, Eileen Power[10] said, "meat was only a use to which sheep not good enough to keep for wool could be put". There were far fewer pig bones amongst the finds, and in fact pigs are rarely mentioned in 16th century wills of the district[11]. This hints that it was then a luxury animal, although by the 19th century the pig was considered to be a poor man's animal. The pigs were probably allowed to roam in the oak woods around the abbey, and there is a record[9] of a porcaria or piggery actually at Fountains Abbey, whereas at most abbeys much of the stock would be kept on granges.

The ox bones found apparently do not represent the "roast beef joints of old England" because the ends of the bones had often been chopped a second time. Unless, therefore, they had been to the table first in a joint, meat was presumably mostly eaten as stew. The large number of feet and jaw bones, which are unattractive for the table, may have been used to prepare stock. Otherwise there seems to have been no preference for particular cuts of meat. However, all the bones could, as Mr. C. M. Mitchell suggests, have been boiled for glue, and the high proportion of feet and jaw bones, which are both rich in gelatine, supports this. In fact this might explain the existence of a dump at all, because the bones would not have been left unless they were completely free from meat. But as mentioned earlier, this was not where they had been put initially; the site of the original dump is not known.

From the lack of horse bones amongst this year's finds, it seems that the monks did not eat horse flesh. I mention this because in 1952 horse bones were found amongst others north of the meat kitchen.

It is of interest that the majority of ox and sheep bones were from at least mature animals, and that the greater

[9] Fowler, J. T., *ed. Memorials of Fountains,* III (Pub. of Surtees Soc., 130 1918).

[10] Power, Eileen, *The Wool Trade in English Medieval History* (1941).

[11] *Testamenta Leodiensia* (Publications of the Thoresby Soc. XIX, 1913, XXVII, 1930).

proportion of ox bones was from fairly old animals, because this suggests that much of the stock was kept over the winter. Had a large number of animals been killed off each year through lack of winter feed, one would have expected to have found a high proportion of bones from young animals. None of the pig bones, however, was from an animal older than eighteen months of age; as with present day animals they were apparently killed young. We also expect to eat lamb and beef, today, from much younger animals than those whose bones were found at the abbey. The great age of many of the ox teeth, coupled with the large size and heaviness, particularly of the feet bones suggests draught oxen—and it seems that they were killed off for meat when too old to work. But the bones could have been from dairy cows, the 1301 survey shows that then the abbey had nearly as many cows as draught animals, and today good milking cows are often kept into their teens.

The finding of both horned and hornless sheep is very interesting because it suggests that the monks kept two kinds or breeds of sheep. I have been unable to find any contemporary descriptions of the sheep that the Cistercians kept in Yorkshire, but it is generally held[12] that there were two kinds viz. hill sheep and "valley" sheep. The evidence for these seems to have come from 18th century writers such as William Marshall[13], who said that the two main stocks of Yorkshire sheep had not changed for centuries.

The hill or moorland sheep were then described as being horned and having black faces and coarse fleeces, and the valley sheep as being tall and clumsy, hornless, whitefaced animals which produced the long, fine wool used in worsteds. In fact the two main stocks can still be recognised today, although there has been much cross-breeding, and each has given rise to several modern breeds. Plate V shows the Swaledale, a horned hill sheep that probably arose from the original black-faced stock mentioned by Marshall, and the large, hornless Wensleydale, a breed, at least one of the progenitors of which was probably the valley stock of Yorkshire.

The horned and hornless skull fragments found at the abbey are shown in Plate IV(a) against the skulls from present day horned (hill) and hornless (longwoolled) sheep. One can see that there is a striking resemblance between the Kirkstall sheep skulls and their modern counterparts. We thus have archaeological evidence which supports the theory of Wroot that the Cistercians had what I shall call hill and longwoolled sheep. But externally they were not necessarily like the sheep in Plate V; for instance, today wool from longwoolled sheep is not regarded as being fine. The mutton improvement which began with the Leicester breed

[12] Wroot, H. E., *Yorkshire Abbeys and the Wool Trade* (Publications of the Thoresby Society, XXXIII, 1935), p. 5.
[13] Marshall, W., *Rural Economy of Yorkshire* (1788).

in the 18th century probably caused longwoolled fleeces to become coarser.

Since one skull (Plate IV(a)) was apparently the only find from the goat, more finds are probably needed to prove that it was monastic. Goats were probably kept as they sometimes are today, to provide milk for orphan lambs, but the only reference found to the goat was one in the documents of Fountains Abbey[14]. This was the mention of some goats flesh being bought for a widow, the monks apparently did not eat it. These documents of Fountains Abbey are useful because nearly all the Kirkstall finds can be related to references in them, and there are few records of animals in the Kirkstall documents. There are records of the Abbot of Fountains receiving presents of venison. There were about as many deer bones as pig bones. The Fallow deer cannot have been long introduced into Britain at the time; it was re-introduced in the middle ages, although it had been indigenous to Britain in Palaeolithic times. In addition the Abbot of Fountains received presents of fowls; partridges and quails were bought for him, and on at least one occasion, swans were bought for guests. Pigeon cotes are mentioned, one actually at Fountains, and there are records of rabbits being bought. Salmon are mentioned, and dried and salted fish (probably cod and ling) are recorded as being brought from Hull, Scarborough and York. Finally there is a record of oysters being bought for the Abbot of Fountains.

Thus if the deposit can be proved to be pre-Dissolution, we have interesting archaeological evidence supporting documentary records, of the variety of meat that the monks ate in their last hundred years. Apart from meat from their own animals, it seems that the monks either bought, or were given, many luxuries, some of which were transported considerable distances.

SUMMARY

Hundreds of bones, mainly from domestic animals were found, roughly 80% of which were from ox, and 10% from sheep. Bones of pig, Red deer, Roe deer, and Fallow deer were present in smaller numbers. The majority of ox and sheep bones were from mature or old animals, whereas the pig and deer bones were from young animals. Although the sheep represented were apparently smaller than present-day animals, most of the cattle were little if any smaller. It is probable that two breeds of sheep were kept.

14 See footnote 9 page 47.

Acknowledgements

I wish to thank Dr. F. C. Fraser of the British Museum (Natural History) for confirming the identity of certain bones, and Mr. K. G. Towers, Lecturer in Veterinary Science, University of Leeds for helpful discussions on the finds, and for the loan of some of the modern bones used for comparisons. I am greatly indebted to Mr. J. Armitage for taking the photographs, and to Dr. A. S. Clarke of the Royal Scottish Museum for reading the manuscript and making helpful suggestions.

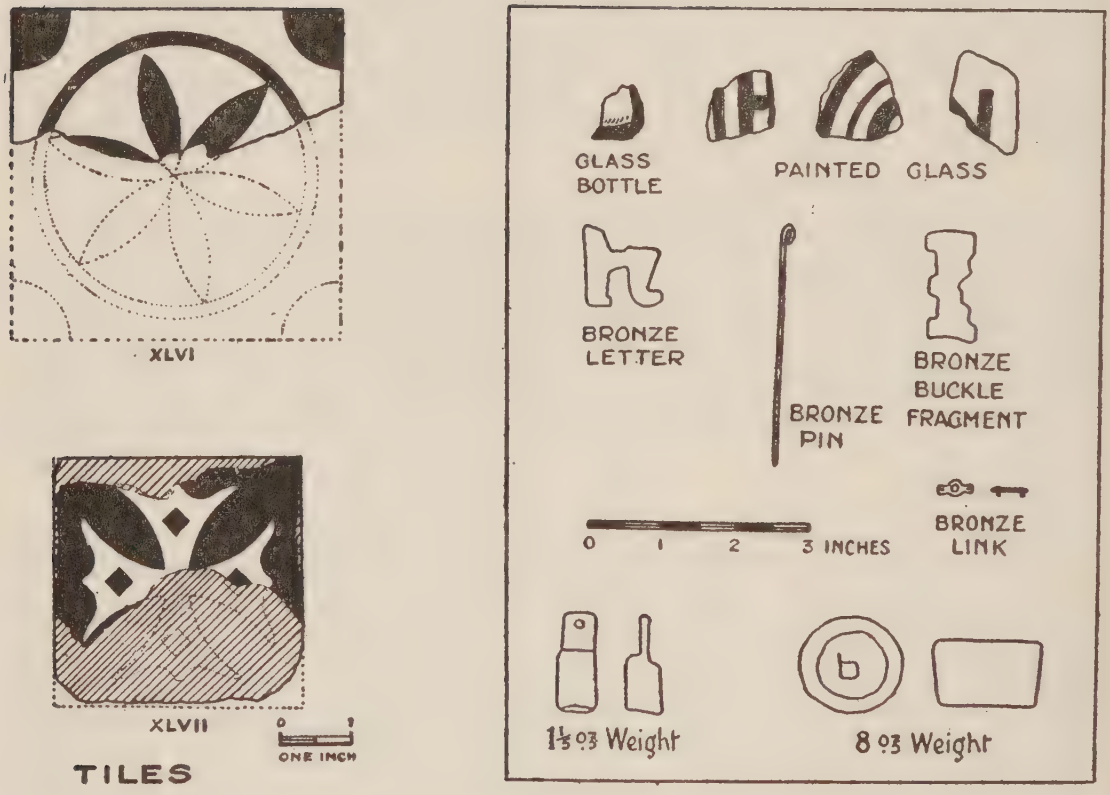


FIG. 14. TILES AND SMALL FINDS.

TABLE I

Number of bones in sample from whole site during main dig (July 1956).

	Ox		Sheep				Pig		Red Deer	Roe and Fallow Deer
			Horned		Polled					
	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.	Lt.	Rt.		
Horn core	—		3		—		—			
Frontal bone	—		2prs		1pr		—			
Skull fragments	2			1						
Maxilla	21			5			1 (4) 1			
Mandible	5 (8) 7		4	3	5	3	4 (1) 5		1	1(R)
Teeth	115			14			5		6	
Atlas	2			—						
Axis	2			—						
Other vertebrae	12			—						
Ribs	5			1						
Scapula	18			2						
Humerus	1 shaft 4 distal			3 distal						
Radius	2 proximal 3 distal			3 proximal						1(F)
Ulna	1 proximal			—						
Carpal	8			—						
Metacarpal	21 proximal			—					1	3(F)
Vestigial 5th Metacapal	1									
Pelvis	3			—						
Femur	4 proximal 2 distal			—						
Tibia	3 distal			4 distal						
Calcaneum	5			—						
Astragalus	5			3			1			1(F)
Cuboid	3			—						1(F)
Metatarsals	42 proximal			—						2(F)
Metapodia	56 distal			—						
Phalanges A.	13			—						
B.	10			—						
C.	8			—						
Species Total	392			57			22		8	9

Total number of bones 488

% number of bones—80% Ox, 12% Sheep, 4% Pig, 2% Red Deer, 2% Roe and Fallow Deer.

TABLE II

Numbers of Bones found at each level during "Cubic Yard Dig" (October 1956)

	Ox	Sheep	Pig	Red Deer	Roe or Fallow Deer	Total	Unidentified
0— 6″	53	2	—	3	1	59	23
	90%	3%	—	5%	2%		
6—12″	77	7	—	1	—	85	75
	91%	8%	—	1%	—		
12—24″	254	21	—	1	4	280	56
	91%	7%	—	0.5%	1.5%		
24—36″	208	31	8	16	2	265	165
	78%	12%	3%	6%	1%		
36—42″	102	22	5	9	3	141	66
	78%	9%	4%	7%	2%		
					Totals	830	385

EXPLANATION OF PLATE IV (a)

A, skull of goat; B, skull of horned sheep; C, skull of hornless sheep, with skulls from present-day hill (H) and longwoolled (I) sheep above. Lower jaws from sheep: D, jaw with 4th molar erupting—lamb about 6 months old (1st molar missing); E, jaw with 5 molars, therefore from an animal about a year old; F, jaw, with 6th (last) molar erupting (1st missing)—from an animal 18 months to 2 years of age; G, jaw with complete set of teeth, which are slightly worn, therefore from an animal over 2 years old.

NOTE that jaws E and F are larger than jaw G; the former are possibly from hornless sheep and the latter is possibly from a horned sheep.

TABLE III

Numbers of bones found in Cubic Yard Dig.

	Ox	Sheep H	Sheep P	Pig	Red Deer	Roe or Fallow Deer
Frontal Bones	—	1	1	—	—	—
Skull Fragments	14	—		—	—	—
Maxilla	—	—		1	—	—
Mandible	7	—		—	1	1(R)
Teeth	31	2		9 (at least 3 animals)	1	—
Atlas	2	1		—	—	—
Axis	—	1		—	—	—
Other Vertebrae	25	6		1	—	—
Ribs	61	12		—	4	1
Scapula	38	3		—	1	—
Humerus	3	1		—	—	—
Radius	6	2		—	—	1
Ulna	4	1		—	—	—
Carpal	16	—		—	2	—
Metacarpal	22	—		—	—	—
Vestigial 5th Metacarpal	1	—		—	—	—
Pelvis	25	6		—	1	—
Femur	1	1		—	—	—
Tibia	3	7		—	2	1
Calcaneum	1	—		—	—	—
Astragalus	5	—		—	1	1
Cuboid	3	—		—	1	1
Other tarsals	14	—		—	3	—
Metatarsals	12	—		—	2	—
Metapodia	23	—		2	1	1
Phalanges A.	1	—		—	—	—
Phalanges B.	8	—		—	—	—
Phalanges C.	8	—		—	—	—
Longbone Fragments	185	36		—	9	3
Other Fragments	175	—		—	—	—
Species Total	694	83		13	30	10

Total Number of Bones 830

% No. of Bones	84%	10%	2%	3%	1%

TABLE IV

Rough Comparisons of Size, and Measurements of Bones (in mm.)

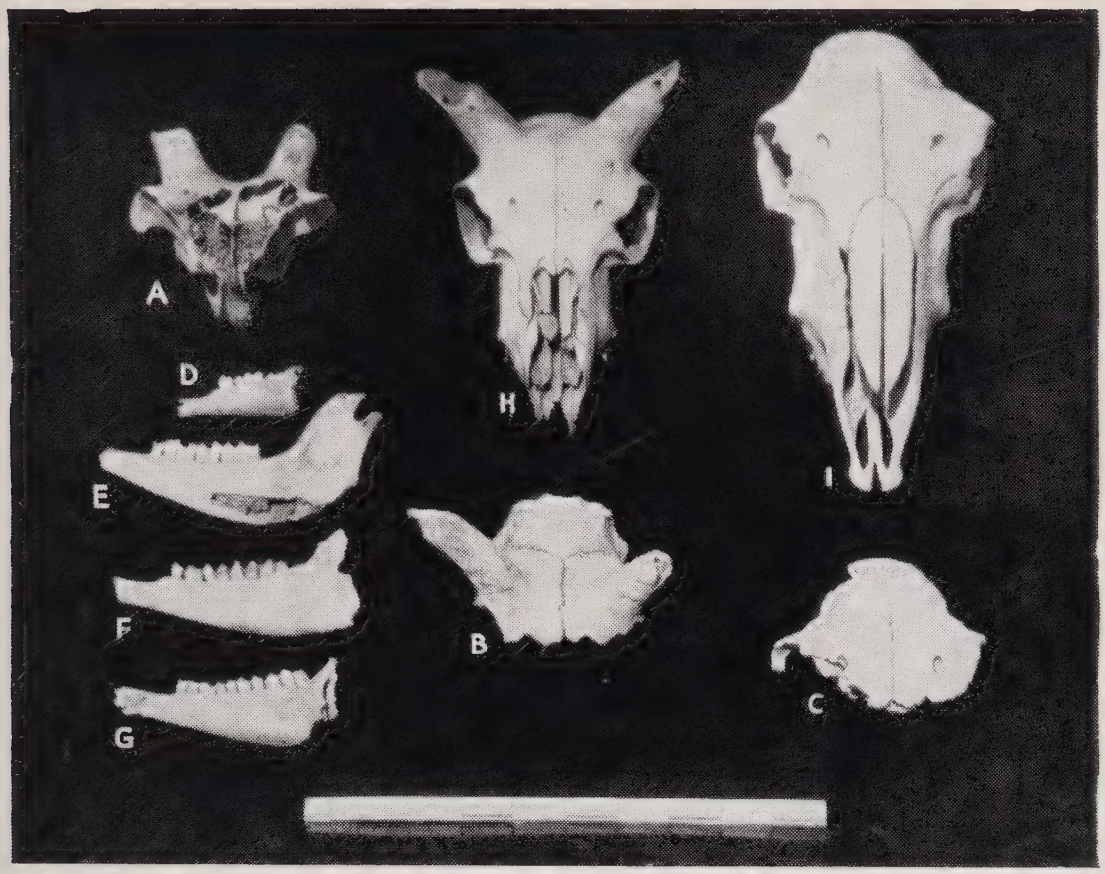
	OX	SHEEP				RED DEER	FALLOW DEER
		Horned			Polled		
		1.	2.	3.			
Horn cores	Length along anterior angle	115	110	80	—	—	—
	Anterior/posterior width	32	26	25			
	Lateral width	23	21	20			
Skull fragment	Similar in size to modern	Similar			¾ modern		
Mandibles	Similar in size to modern	Probably smaller					
		? horned			? polled	lamb	
	Depth at 1st (pre) molar	15			20	13	rough average figures, see Plate IV (a)
	Depth at last molar	30(6th)			35(6th)	20(4th)	
Vertebrae	Similar	—				—	—
Ribs	Similar	Similar					
Scapula	Smaller	Similar					
Humerus	Shaft 1/6th smaller	—					Radius (Young) about 190 mm. long.
	Distal end similar	Distal end smaller					
Radius	Proximal end 1/5th smaller	Smaller (length 150mm.)					
Femur	Shaft 1/6th smaller	—				—	—
Tibia	Distal end ¼ smaller	Distal end 1/5th smaller (length about 160mm.)				—	—
Calcaneum	1/6th smaller	—				—	—
Astragalus	Similar	Smaller					
Metapodia	Similar or larger	—				length about 230mm.	length about 195mm.
Width proximal end	Normal[3]		Broad		Small Ox	Modern Ox	Red Deer	Fallow Deer
Width distal end	M.C.[1]	M.T.[2]	M.C.	M.T.	Plate IV (b)			
Ratio inner/outer	62	51	—	—	M.C. —	M.T. 44	M.C. 70	M.T. 60	M.C. 39	M.T. —	M.T. 28
Articulating surfaces	63	63	72	78	—	48	68	60	—	—	30
	8/15	10/12	9/23	9/23	—	5/6	5/8	4/7			4/6

[1] Metacarpal

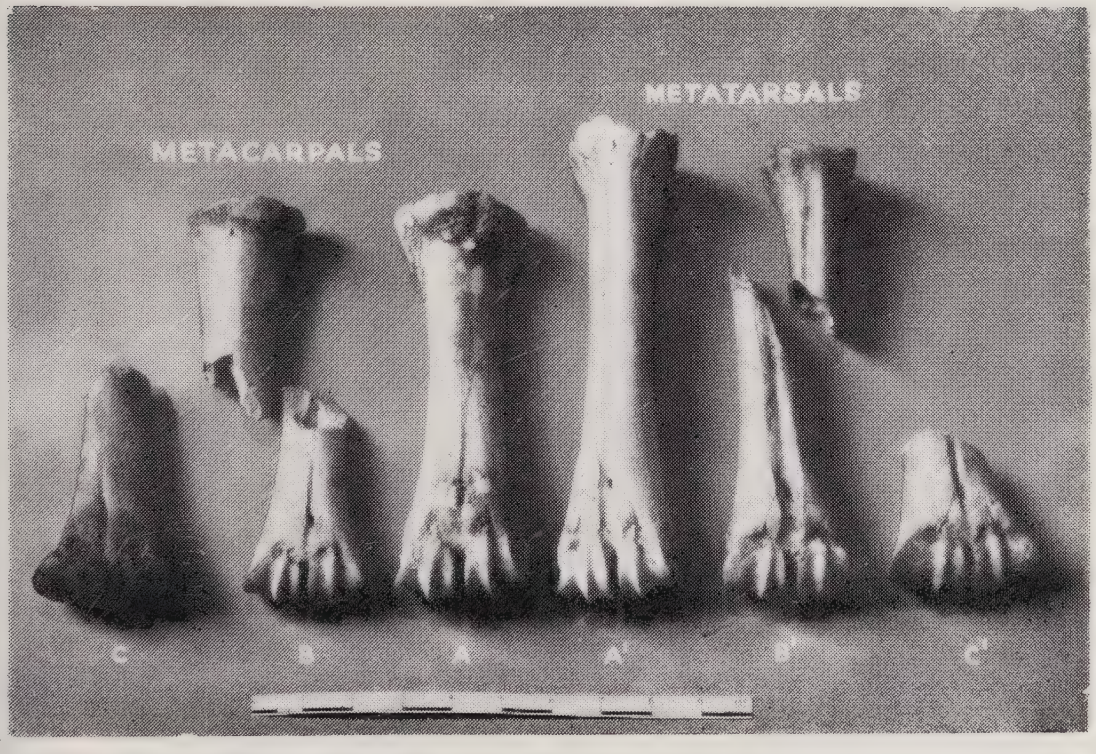
[2] Metatarsal

[3] Means from 6 to 12 measurements.

PLATE IV

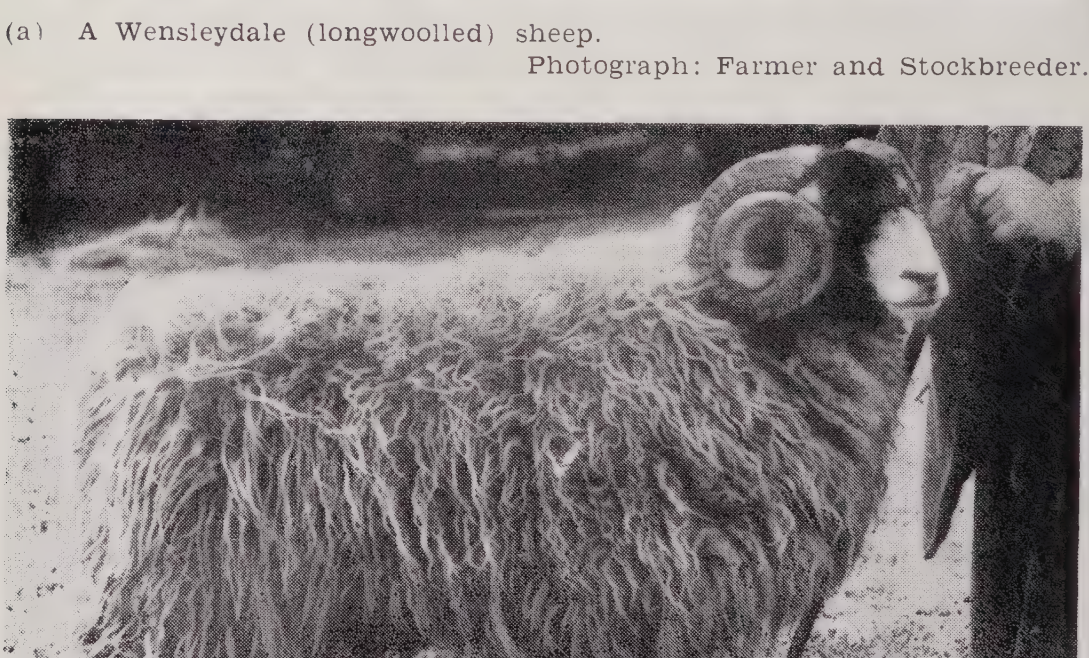


(a) Explanation on P.52.



(b) Ox metapodia; A, A¹, modern; B, B¹, "normal" monastic specimens; C, C¹, monastic specimens with broad distal ends.

(a) A Wensleydale (longwoolled) sheep.
Photograph: Farmer and Stockbreeder.



(b) A Swaledale (hill) sheep. Photograph: Farmer and Stockbreeder.

PLATE VI

SECTION SHOWING MODERN POND FILL (WHITE) ON BONE LAYER
WITH 13th CENTURY WALL ON MEDIEVAL 'MADE GROUND'

PLATE VII

(a) MEAT-KITCHEN ANNEXE SINK AND DRAIN

(b) FALLEN MASONRY FROM REFECTORY

Kirkstall Abbey Excavations

8th REPORT, 1957

by DAVID OWEN, Ph.D., F.M.A., F.G.S.

1. INTRODUCTION.

THE seventh season of fieldwork in 1955 had limited the southern walls of the meat-kitchen annexe and had exposed walls south-west of the meat kitchen and south of the refectory, whose presence had previously been unsuspected. It was therefore necessary to uncover the whole of the meat-kitchen annexe walls and a wide area of floor and to explore the newly found walls farther west and south. In addition, magnetic survey and water-divining had suggested areas both north of the abbot's lodging and north-east of the church as being worth uncovering. The latter area is the one where the graveyard would normally be sought.

The excavations were directed by Dr. David Owen assisted as before by Mr. C. Vincent Bellamy, Mr. C. M. Mitchell, and Mr. Maurice Greaves. Mrs. Jean Le Patourel took charge of the pottery and Dr. Michael L. Ryder made a further study of the animal bones. Their reports are appended.

2. WEST OF THE WALLS.

A long trench was dug west of the walls of the circular building uncovered in 1956, extending from south to a little south-west of the refectory. A few inches beneath the soil was a lot of very heavy masonry. A corner of masonry formed by the junction of two heavy walls lay obliquely on clay and stones, with no trace of foundation. The ashlar was of such size and the corner of such massiveness that it clearly belonged to a very large building. Such a building would normally have had a foundation trench filled with large boulders, upon which the wall would have been built. The absence of this suggests that the corner represented fallen masonry. A few feet to the north are the footings of the south wall of the refectory, but the wall and its south-east and south-west corners are both missing. The masonry is closely comparable to that in the walls still standing and there is little doubt that it represents a part of the south-west corner.

Below this masonry was a short wall running north and south, bounded at both ends by single large rectangular stones. At the south end, this wall adjoined the short length of curved walling running west of the circular building. This had clearly been broken into and much of it removed before the north to

south wall had been built. As the destruction of the walls of the circular building was shown in 1956 to be of mid-fifteenth century date when the meat-kitchen was built, the erection of the north to south wall would probably have occurred at approximately the same time and certainly not earlier. West of the south-west corner of the refectory, another short length of wall was located also running north and south. At the north end, it was cut by a modern post hole. St. John Hope would appear to have seen something of these two walls, as an undated length of wall forming three sides of a rectangle is shown on his plan. This building would appear to have butted on to the south west of the refectory but may have had no direct connection with it. There may yet be more walls to be uncovered farther west.

Unsealed, and lying near the surface were animal bones, but no definite bed of them could be separated.

3. SOUTH OF THE WALLS.

In 1956 the circular building was uncovered as far as was possible, but much of the south side lay beneath the tar macadam road. The little bath drain, which had been traced across the courtyard and beneath the meat-kitchen, had last been seen running under this road. A deep trench was therefore located south of the roadway in prolongation of the bath drain and south of the circular building. This was taken down to a total depth of over eleven feet in places, and showed a section of the utmost importance in assessing the early stages of development of the abbey.

The lowermost layer was soft, wet, blue river mud. This had clearly been deposited by a wider, slower, more marshy river flowing farther north than the Aire does today. This same mud had been noted in 1956 below the medieval "made ground" in which the thirteenth-century bath drain was built. The bottom of the mud was not reached in the trench. Eighteenth and early nineteenth century plans of Kirkstall Abbey mark the positions of the fishponds. There are two of these, each markedly rectangular in shape, one lying south of the cellarium and the other, south of the abbot's lodging. If the positions of these two ponds are joined up on the plan they look very like a northern arm of the river Aire. If the eastern end is continued in a curve to the south, it is co-extensive with the present course of the river beyond the weir, where it flows southwards. Thus it suggests that the river Aire at Kirkstall in the twelfth century flowed in two or more streams, the northern arm swinging close to the present buildings. This is a common pattern for rivers before their courses were artificially deepened by man.

In the section, lines of oaken stakes were driven into the mud and oaken planks were fixed horizontally by small dowels. The southern edge of this timber construction was about twenty-five feet south of the northern extension of the river mud—that is twenty-five feet south of the original river bank. It was therefore either a wooden jetty or wooden revetting of the river bank and was clearly arranged as a landing place for barges or rafts. Further, it would act as a jetty with the river at its present level, but would be left high and dry if the present dam were removed. This suggests that either the river was more sluggish and flowed at a higher level in the Middle Ages, or that the monks built the fore-runner of the present dam. It is known that most of the stone with which the abbey was built came from the Bramley Fall quarries south of the river and a few hundred yards upstream. Many large blocks of stone lie north of the timber stakes, probably where they fell when they were unloaded.

The deep trench had been sited largely to trace the small bath drain. This, however, was not found. It seems certain that it had fulfilled its purpose in carrying waste waters to the river. Its last twenty feet or so were in medieval "made ground."

Over the top of the timber jetty or revetting, was a thick layer of stone clay—medieval "made ground." Perhaps the jetty was of no further use when the main buildings had been completed. The slope of the river is such that it would never have been navigable for more than a few hundred yards—sufficient for ferrying stone, but not for any other purpose. It seems likely that the monks wanted more ground and that they acquired it by filling in parts of the river. If the fishponds do represent remnants of a northern channel, it was at this time, sometime after the small bath drain was laid in the early thirteenth century, that they were formed. Stony clay was dumped in at least three areas across the channel, dividing it up into the rectangular fishponds. A series of trenches was excavated farther south and each was stopped in the medieval stony clay, which therefore extends at least sixty feet south of the jetty and eighty-five feet south of the old river bank.

Upon this thick deposit of clay were built walls which ran south. Two such walls were uncovered. The one farther west had an offset course and sloped in on both sides, but more steeply on the east. On the north it made for a point just east of the centre of the circular building. If it proved possible to excavate the asphalt road at this point, the junction of this building and the wall should be seen. The actual construction of this wall, of the walls of the circular building, and of the short curved walls running east and west from it, was closely similar. The wall ran south for at least seventy-six feet and should be sought farther south still. Typically, the widths of the wall at the offset course,

at the lowest course above the offset and at two feet, were four-feet seven, three-feet seven and three feet respectively. It appears that this wall was the east side of a very large building and that the circular building was some form of tower in its north-east corner. Constructed not earlier than the thirteenth century, it was taken down in the fifteenth. No lay brothers' infirmary has yet been located for Kirkstall Abbey, and the position of this building suggests that that may have been its purpose. West of the wall, level with the offset course, were traces of a mortar floor.

East of this long wall is another of much lighter construction. It is roughly continuous with the length of north to south wall seen north of the asphalt road in 1956. These two stretches, however, are exactly parallel to the refectory walls and are not quite in line. It therefore appears that there must have been a small zig-zag in the wall. In 1956 the north-west corner was uncovered. This year the south-west corner was seen and the south wall was traced twenty-seven feet to the east. In internal length the building from north to south was thirty-seven feet. The offset course of the wall only was seen in 1957. In 1956 the lower courses of the wall were visible at the north-west corner and were only eighteen inches in thickness. The narrow walls and great width of the building indicate that it was one story only and suggest that it was an outbuilding or farm. The south wall had clearly been demolished carefully and was absolutely level. It was so flat in one place that it formed the floor of a small open drain from the meat-kitchen described below. There were traces of a mortar floor in the south-west corner. The excavations did not extend far enough to locate an eastern wall. The eastern end of the south wall was again cut off abruptly and a small covered drain ran obliquely from north-east to south-west. Time did not allow for this drain to be followed.

Between the walls of the two buildings described above was a layer of heavy stones which doubtless represented the period when the two buildings were demolished to make way for the meat-kitchen and its annexe about the middle of the fifteenth century. Over this layer and over all the walls lay the next layer, a dark bed of soil containing large numbers of animal bones. This layer was seen in 1956, and the bones were then described by Dr. Ryder. A much greater area was uncovered and Dr. Ryder has again made a study of the bones. How far the layer extends is still not known. It was not recognisable in the western trench described above, though bones recovered probably belong to it. It lay thick beneath the modern deposits as far south as the walls were traced, and as far east as the 1957 trenches went. It was not found in the deep trenches sunk south-east of the buildings to trace the course of the main drain in 1956. It lay against the walls of the meat-kitchen and meat-kitchen annexe, but did not

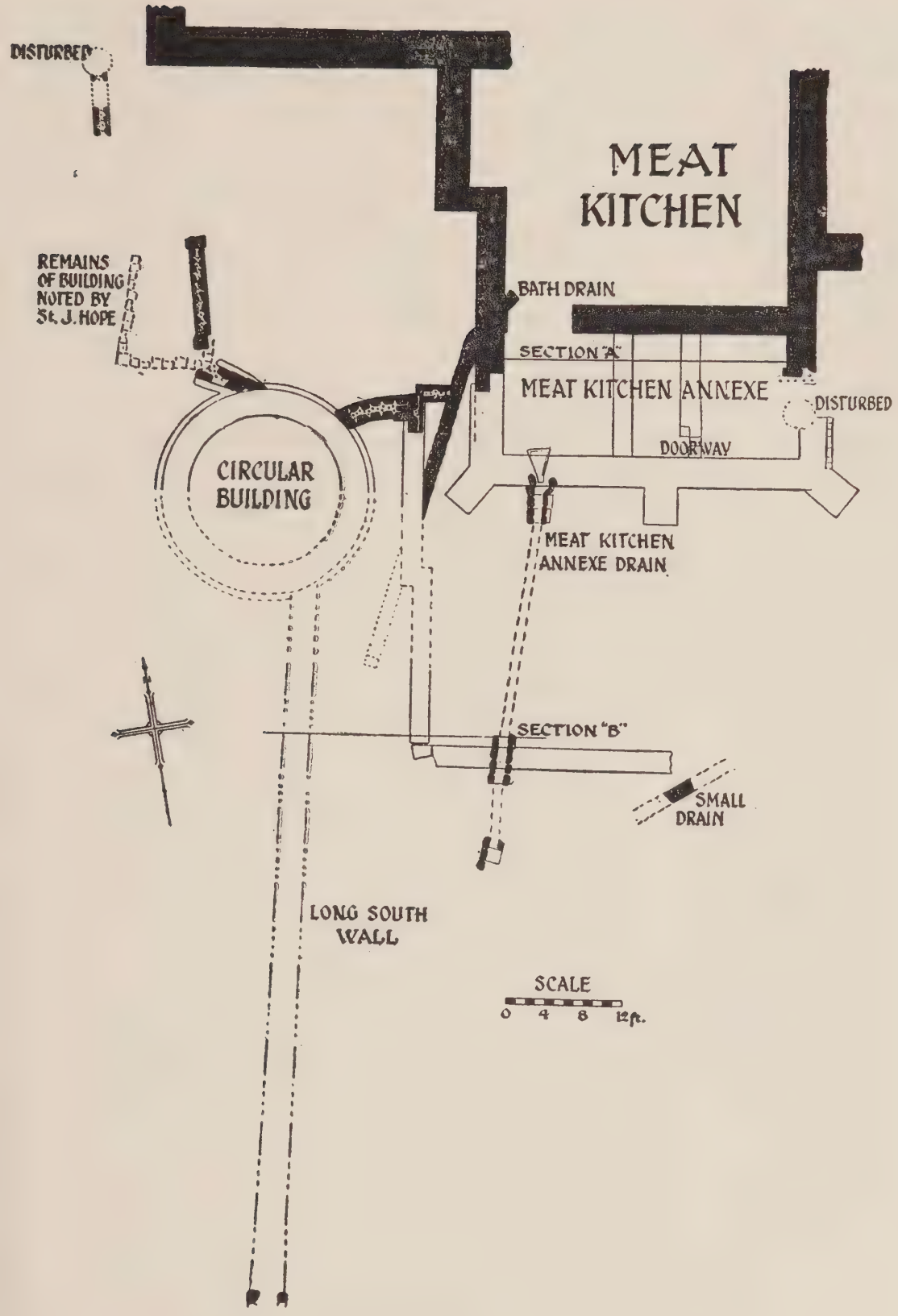

DISTURBED
MEAT KITCHEN
REMAINS OF BUILDING NOTED BY St. J. HOPE
BATH DRAIN
SECTION "A"
MEAT KITCHEN ANNEXE
DISTURBED
DOORWAY
CIRCULAR BUILDING
MEAT KITCHEN ANNEXE DRAIN
SECTION "B"
SMALL DRAIN
LONG SOUTH WALL
SCALE
0 4 8 12ft.

FIG.15

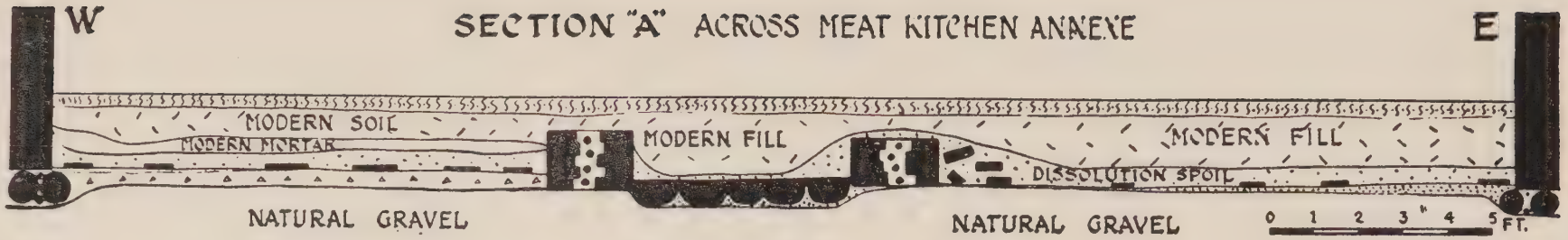
occur within. It filled in hollows of most uneven ground and its thickness varied considerably. In 1956 this layer had not been found sealed by anything but modern layers. It had clearly collected while the meat-kitchen annexe building was standing complete, but this is shown in an early eighteenth century print and was probably not demolished until about 1750. This season, a small open drain, described below, and issuing from the meat-kitchen annexe was found to rest on the lowermost levels of the layer and to have other higher levels banked against the sides. The drain was therefore laid after the bed had started to accumulate. The bone fragments beneath the drain were much more fragile than elsewhere but this can be explained by the alternate wet and dry conditions beneath the drain.

Above the bone layer were other layers all of modern origin. In the early days of this century there had been a shallow lake or skating pond filled in winter but empty in summer, oval in shape, which extended from close to the tar macadam road to near the bank of the river. Its outline was clearly seen when the dig started, owing to prolonged dry weather. About thirty-five years ago the pond was filled in. Large quantities of cinder and rubbish from the Corporation Destructors had been dumped and covered by a few inches of soil, which had been turfed. A modern pipe lay deep in the deposit carrying water to a fountain whose rusty remains were unearthed at about four feet below the surface.

Thus the area south of the ruins shows an interesting sequence of events. Originally a shallow arm of the river, it was made navigable for barges or rafts to bring stone from the quarries across the valley. Later, parts were filled in to give more land for building and short sections were left as fishponds for the abbey. The buildings erected thereon were demolished in the fifteenth century, or perhaps fell into disrepair through lack of use. At this time, the meat-kitchen and its annexe and other small buildings were erected. The fishponds were visible long after the Dissolution and are marked on eighteenth-century plans, though they must eventually have silted up. Finally the skating pond was made, only to be filled in in its turn to make way for the pleasant lawns which now surround the Abbey.

4. THE MEAT-KITCHEN ANNEXE.

The walls of the meat-kitchen annexe were traced in their entirety. The eastern wall was shown to be broken, presumably by a doorway, though later disturbances prevented this being established, and to have had its southern portion offset slightly eastwards. The south wall was seen to have had a sturdy central buttress similar in structure to the corner buttresses. No trace at all was found of a curved south wall which is shown in an early eighteenth-century print.


W
SECTION "A" ACROSS MEAT KITCHEN ANNEXE
E
MODERN SOIL
MODERN MORTAR
MODERN FILL
MODERN FILL
DISSOLUTION SPOIL
NATURAL GRAVEL
NATURAL GRAVEL
0 1 2 3 4 5 FT.

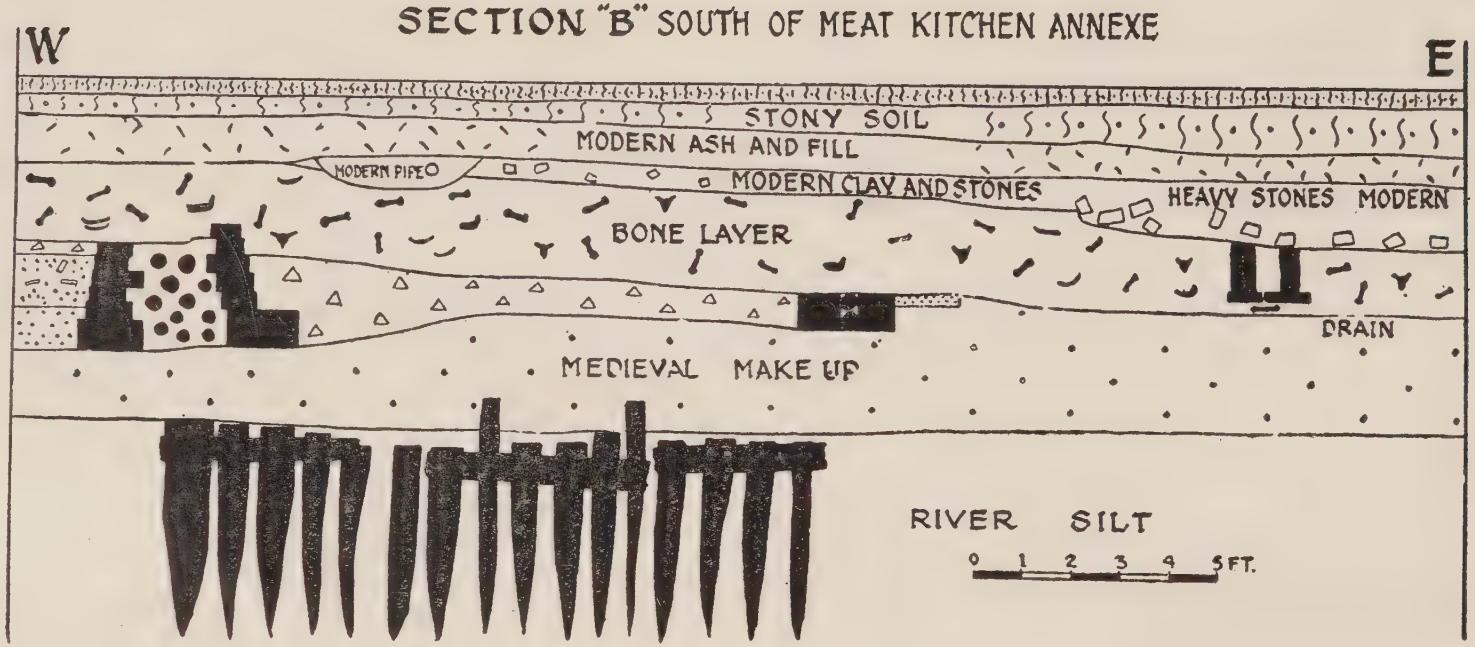

SECTION "B" SOUTH OF MEAT KITCHEN ANNEXE
W
E
STONY SOIL
MODERN ASH AND FILL
MODERN PIPE
MODERN CLAY AND STONES
HEAVY STONES MODERN
BONE LAYER
DRAIN
MEDIEVAL MAKE UP
RIVER SILT
0 1 2 3 4 5 FT.

FIG. 16

The internal arrangements were found to be rather more elaborate than was suspected in 1956. The room on the western end had traces of a flag floor particularly along the south side. Adjoining this, and built right through the wall was a shallow funnel-shaped sink. Its lip was level with the flags and its floor an inch below. It would clearly have acted most effectively as a drain to carry away waters used to swill the floor. Outside the building the sink was extended by an open drain which flowed southwards. This drain had a floor of heavy flagstones on which rested the ashlar sides. No attempt had been made to keep it water-tight by caulking the sides or the junctions of the flags and the drain had clearly been open throughout its course. As has been mentioned above, the flags rested on the lowermost level of the bone layer and the drain crossed the levelled footings of the southern wall of the demolished building. This small drain was not traced to its southern termination. The western room of the annexe, then, could be readily swilled out. Perhaps it was the actual slaughter house.

Two walls running from north to south divided the annexe into three portions and cut off a central room. This had its doorway, which was rather narrow, in the southern end of the eastern wall. The room was less than five feet wide and extended from north to south of the annexe. It was floored with thick, well-laid slabs whose close-fitting edges had been mortared. This room would have been perfectly insulated and may have been used as a meat store.

The third room had no special features. There were traces of a flag floor and it had access to the meat-kitchen and to the outside. Possibly it was used for preparing the meat for cooking.

5. THE EASTERN COURTYARD.

East of the sub-dorter and north of the abbot's lodging is an open courtyard. St. John Hope noted the footings of a wall which ran from east to west in the southern half. A trench was sited adjoining the sub-dorter to uncover this wall foundation and to note any traces of metal which seemed to give certain surface reactions. The wall footings three feet wide were exposed where St. John Hope had marked them. They stopped three feet from the small doorway into the sub-dorter. They were set in a shallow trench, and north and south the natural boulder clay came up to within nine inches of the surface. No sign of metal or slag was seen.

6. THE CEMETERY.

It is usually considered that the monastic cemetery lay north-east of the church. Surface examination suggested a number of disturbances which might have been graves, a few of which seemed to contain metal. Two six-foot square trenches were sunk,

one each in an area where a grave had been indicated. The natural boulder clay was within two feet of the surface and in neither trench was there any sign at all of disturbance. Both the courtyard and the cemetery trenches had been designed primarily to test the accuracy of certain surface indications of disturbance, but neither produced any result at all.

7. SMALL FINDS OTHER THAN POTTERY.

Coins.

Long cross penny Edward III group D. late 1353. *Obv.* Crowned head facing. EDWARDVS REX ANGLI Z. *Rev.* Long cross, three dots in each segment CIVITAS EBORACI. Found unstratified in courtyard north of abbot's lodging, and east of sub-dorter.

Long cross Edward III ecclesiastical penny of York perhaps "Treaty" or "Post Treaty" i.e. after 1361. This coin is in very poor condition. Found in a grey soil layer of post-monastic date over south wall of eastern building south of main buildings. We should like to acknowledge the help of Mr. D. Harkness, B.Sc., in identifying these coins.

Casting Counter. *Obv.* A heater-shield of France-modern, surrounded by three groups of two pellets and an annulet. AVE MARIA GRACIA PL. See Barnard "The Casting Counter and Counting Board," no. 46 of the French series. *Rev.* See Barnard plate XXIII.I Low Countries 1363-1404. This counter would appear to be early fifteenth-century and was found in the bone layer adjacent to the northern end of the western long wall.

In addition, a George III penny of 1797, another of 1807 and a model half farthing of Queen Victoria were found in post-monastic layers.

Metal.

Copper. A disc of copper, slightly hollowed, with a rectangular hole in the centre occurred in the bone layer. It measured just less than $1\frac{1}{2}$ by $1\frac{1}{4}$ inches and its hole $\frac{1}{4}$ by 5/16 inch.

A belt-buckle was uncovered in late monastic layers in the trench south of the refectory. It measured $1\frac{1}{8}$ by $\frac{7}{8}$ inch and was in the form of a rectangle with a cross bar.

Tiny fragments of thin copper tubing were found unsealed in the meat-kitchen annexe.

Lead. A fragment of lead, two inches across, discoidal on one face and flat on the other, had clearly been tapped out of a ladle. It came from beneath the meat-kitchen annexe floor.

Iron. Numerous iron nails comparable to those described in earlier reports, particularly in the second report, were found in all monastic layers.

Shells.

Oysters *(Ostrea edulis)* and Mussels *(Mytilus edulis)* were found occasionally in most layers and areas. A number was found sealed by mortar in the meat-kitchen annexe south wall.

A single *Tellina balthica* was found unstratified in the meat-kitchen annexe.

Glass.

Many fragments of devitrified glass were found in most monastic layers.

Stone.

Two flat oval discs of flaggy sandstone, roughly shaped by chipping, were found in the trench south of the refectory, the one in late monastic layers and the other unsealed. Both measured approximately 3 inches by 2½ inches, the one ½ inch thick and the other 1½ inches.

A small stone kilnprop, similar to those collected in previous years, was found unstratified, adjacent to the long north and south wall. It was just under 2 inches square by 1 inch thick.

A small flake of flint occurred west of the long north-south wall level with the offset course beneath the possible floor level.

A small stone marble, quite spherical, ⅝ inch diameter occurred in the medieval make-up beneath the long walls. It would thus date to the thirteenth century.

THE POTTERY (by H. E. Jean Le Patourel, B.A.)

The pottery this year was fragmentary though plentiful, and for the most part the pots it represented, where such were recognisable, were of types already known at Kirkstall. Of the areas excavated, that to the south of the macadam pathway (see p. above) was the only one where stratification was observed. It was unfortunate that the most interesting level here, that of the blue clay in which the timbers were embedded, and which might be expected to yield pottery from the period of the abbey's construction, produced only three tiny sherds. Two of these appeared to be from unglazed pots of twelfth-century type; the third was of very thin, slightly gritty ware with a good greenish-brown glaze on both surfaces. It does not resemble any pottery previously found at the Abbey. In the medieval make-up above the blue clay more pottery fragments were found, but they were neither plentiful nor large in size. For the most part these pieces were from vessels of types previously dated at the abbey to the thirteenth or fourteenth centuries, but among them were some half-dozen sherds of considerably later date, including two pieces of a bright green-glazed bowl of the kind found in the Refectory in 1953, and dated then to the sixteenth century. (See Kirkstall Abbey, 4th Repart. Fig. 18. No. 7). Perhaps the most

interesting find at this level was a small part of a lid in the local gritty ware, green glazed on its upper surface and decorated with incised concentric circles.

Higher up in the same area the "bone layer" again provided plentiful pieces of late pottery, but hopes that these fragments might complete the sections of vessels found in the same level last year were disappointed. Like last year, the level produced a preponderance of fifteenth to sixteenth-century pottery, with a sprinkling of earlier and of post-monastic sherds. Among the later finds was a piece of what might be called "reversed Cistercian ware". The sherd formed part of a small pot and had a clear yellow glaze, decorated with dark brown applied slip in the form of a rosette. The pot might be of post-monastic date, but such a reversal of the usual colours has been found at Pontefract Castle. J. T. Micklethwaite described rather similar pottery from both Sandal Castle and Kirkstall Abbey, but gave the colour as white[1]. It is not clear however whether he was referring to the fabric or to the glaze, and the pottery itself cannot be traced. Also from the bone layer came a small twisted handle (not illustrated), very similar to that on a small jug[2] found in 1951 (Kirkstall Abbey, 2nd Report. Fig 9, No. 21), and part of a toilet vessel (Fig 17, No. 5) of a type common in Scotland and found also in northern England.

Of the pottery from the remaining areas excavated, three bowls are illustrated. One of these (No. 3) seems to belong to the fifteenth century or later, when earthenware bowls are uncommon at the abbey.

DESCRIPTION.

1. Bowl in hard, gritty fabric, grey core, red surfaces; thin yellowish-green glaze on interior only, covering the base and extending half way up the sides. The exterior has been trimmed for two-thirds of the height. Thirteenth or fourteenth century. From the area west of the circular building.

2. Part of a bowl in gritty ware. It is covered over the interior and part of the exterior with cream-coloured slip, over which there are occasional patches of pink slip. The exterior is partially glazed in green. There is the mark of a handle junction, probably of the horizontal type (See Kirkstall Abbey 2nd Report. Fig. 8, No. 15.). Thirteenth century. From the meat-kitchen annexe.

3. Part of a bowl in very hard gritty ware with external dark brown glaze. Probably intended to take a lid. Fifteenth or sixteenth century. From the area west of the circular building.

[1] *Proc. Soc. Ant.* vol. xv, 1893-5, pp. 5-9.
[2] For distribution map see *Cumb. and West. Ant. and Arch. Soc. Trans.* New Series, vol. lv. p. 78.

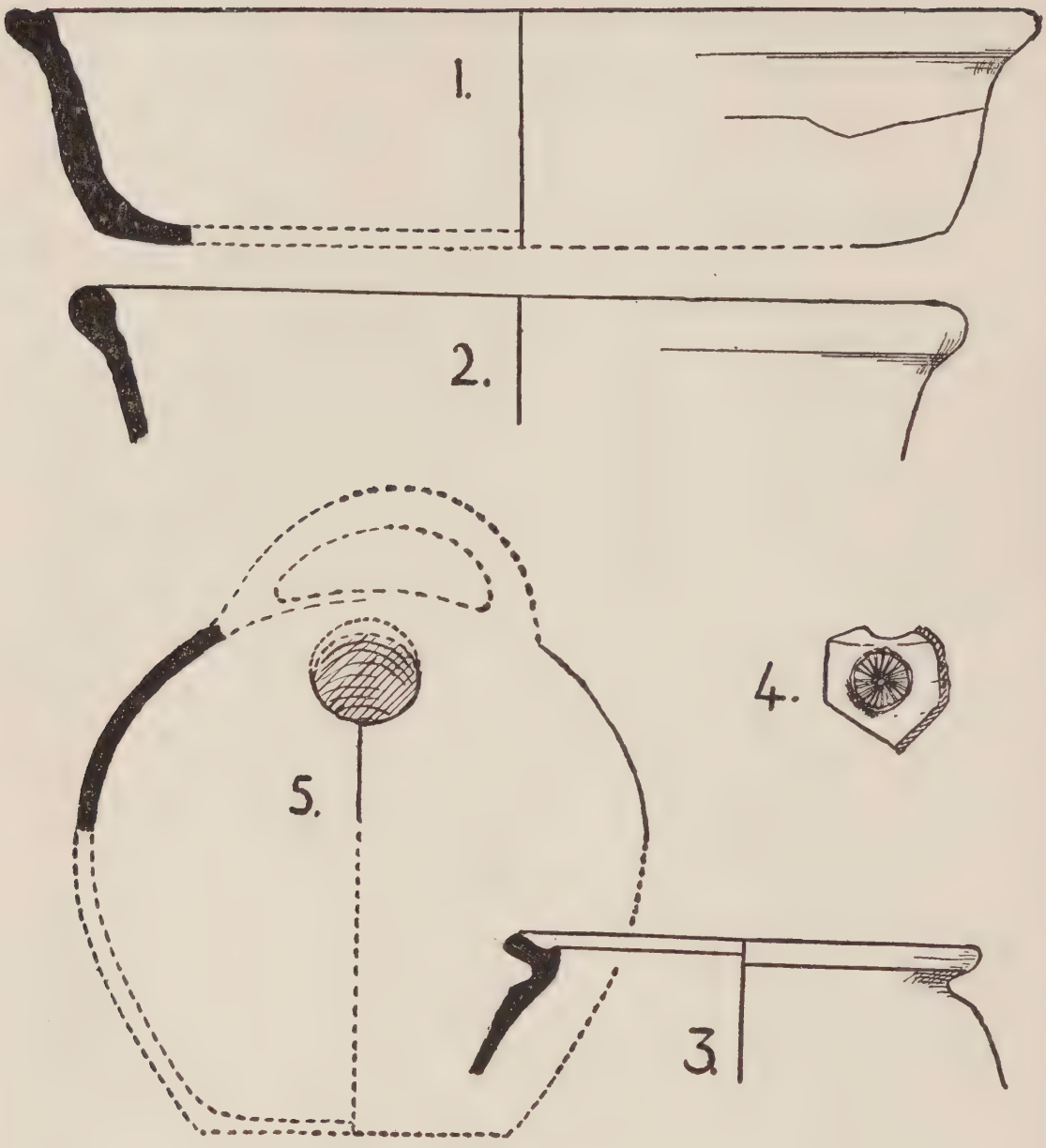


FIG. 17. POTTERY. SCALE ¼.

4. Part of a small pot. Whitish core, glazed on both surfaces with good quality orange-yellow glaze, decorated with brown slip. Sixteenth century or later.

5. Part of a urinal. Gritty fabric, pink, with poor quality, patchy clear glaze on exterior, and a splash below aperture on the interior. Thirteenth or fourteenth century. From the bone layer.

REPORT ON THE ANIMAL BONES,

by Michael L. Ryder, Ph. D., M.Sc., M.I.Biol

Bones were as common as in last year's dig[1], the same deposit being encountered. This has now been shown in the two years to extend over an area about 40 yards long (towards the river) by at least 25 yards wide. The bones were in a continuous layer, from 18 inches to 1 yard in depth, which was fairly near the surface in the area of the meat-kitchen annexe and the workshop range, but was several feet below the ground in the trenches dug beyond the tar macadam path, i.e. it followed the original contours. A small part of the bone layer was sealed under a 15th century drain leading from the meat-kitchen annexe.

The bones were again mostly very fragmentary but every one was kept. This ensured that all complete bones were saved for measurement and provided an extremely large sample to be counted. When sufficient bones had been counted (these being returned when filling the trenches), every one found subsequently was still kept in order to ensure that nothing of interest was discarded.

Although most of the fragments had apparently been chopped, there were a few with clean cuts (as if made with a saw) like some seen last year. A few fragments of calcined bone were found and there was a distal end of a sheep tibia with a small man-made hole through it. Repeated reference to the earlier reports has been omitted on the assumption that this account will be read in conjunction with last year's report.[1]

1. SPECIES FOUND.

MAMMAL: Rat (half of pelvic girdle).
Rabbit (mandible and humerus sealed under floor of meat-kitchen annexe); Hare (at least 8 bones).
Dog (humerus, femur and two vertebrae).
Ox, Sheep, Pig.
Red, Fallow and Roe deer.
Horse (astragalus).

[1] *Kirkstall Abbey Excavations, Seventh Report* (1957)

BIRD: Over 50 bird bones (mainly limb) were found; these were difficult to identify, but included the following:
Domestic fowl.
Duck—domestic and some from Mallard (wild duck).
Goose (wild)—some possibly domestic.
Raven, Jackdaw, Heron, Woodcock, Black Grouse, (Blackcock), ? Kestrel and Pigeon.

FISH: There were about 40 fish bones. One vertebra with a rib attached had a diameter of 7 mm. and was comparable in size to a salmon vertebra. The diameters of 11 others ranged from 12 to 23 mm. and the frequencies of the different diameters found during 1956 and 1957 are as follows:—12 mm (1), 13 (1), 16 (4), 17 (3), 18 (2), 19 (3), 20 (1), 22 (2), 23 (2).
The remainder included branchiostegal rays, fin rays, ribs and one or two skull bones all of which were difficult to identify. One skull bone was from a fish much larger than a cod, and so presumably a sea fish. In addition there was a tooth from a large ray.

2. The Different Bones Found.

These are shown in Table V. In the ox, the animal most completely represented, there did not seem to have been a preference for any particular joint. The metapodia however, were common again and although the frequency of different bones did not vary on the whole in the different batches counted, one batch contained a high proportion of metapodia. It was interesting to note what parts of different bones were preserved best. Among skull fragments the upper and lower parts of the orbit were complete. The transverse processes of the atlas were well preserved and also the odontoid process of the axis. The glenoid cavity of the scapula was complete but had always been chopped from the blade; the only part of the blade usually preserved was that bearing the spine. The acetabulum was usually the only part of pelvic girdle found. The proximal end of the tibia does not seem to keep well. On the other hand carpals and tarsals were usually complete. In addition to the bones shown in Table V there was a patella, four sesamoid bones, and one vestigial fifth metacarpal of ox.

Bone Fragments Found Sealed

(a) Under 15th century drain:—

Ox: maxilla with unworn teeth; mandible; vertebral spine; scapula; humerus (proximal); two radii (one with fragment of ulna); pelvic girdle; two metapodia; complete carpal and phalanx; 5 longbone fragments; 21 other fragments.

Sheep: frontal bone with horn core 10 x 15 mm. wide at base and 22mm. long (lamb); two scapulae (blade); tibia.
Pig: incisor; two molars.
Fallow deer: calcaneum.
Goose: fused 2nd and 3rd metacarpals.
22 fragments—sheep, pig, or deer size, including three calcined.

(b) Under floor of meat-kitchen annexe:—
Cockle shell *(Cardium edule)*.
Rabbit: mandible and humerus (already listed).
Pig: molar.
?Ox: four fragments.
Pigeon: femur.

Bones Showing Pathological Conditions

Three bone fragments showing pathological changes have been found. The first, found in 1956, was a portion of sheep tibia showing an area of local periostitis. The lesion probably underlay an inflammatory condition, such as an abscess, in the superficial tissues and the fragment appeared to have been chopped from the rest of the bone because of the lesion.

The distal end of an ox metatarsal exhibited a growth of new bone around the edge of the articular surface. This arthritis may have affected the articular cartilage, but the underlying bone was unchanged. The new growth was well developed on both anterior and posterior aspects of the bone, and in the former had changed the arterial groove into a tube.

The third find was a vertebral body, probably bovine showing a spondylitis in which the new growth had resulted in bone extending over the intervertebral disc to produce the effect of "lipping."

3. The Relative Numbers of the Different Species.

The bones were counted in groups from three areas: meat-kitchen annexe, workshop range, and the large area south of the walls. About 500 were counted in each of the first two areas, and these were counted at four levels, but no differences in the frequency of the different species were found. Those in the third area were obviously from a single layer and here nearly 3,000 were counted; the result is shown in Table V. Ribs were omitted as being not easily identifiable. In general no attempt was made to distinguish left from right bones and, although proximal and distal ends are listed separately, these were added together in the totals. Again, therefore, the percentages are from the numbers of bones, but at a very rough estimate the ox bones possibly represent about 40 animals. Several barrow-loads of unidentified

ox fragments were accounted for by the low estimate of 1,500 bones and it is obvious that addition of these gives a clearer picture of the predominance of the ox, and of the relative proportions of the other animals. Pig bones were more, and deer bones less, plentiful than was realised last year, but there were too few deer bones to obtain an estimate of the relative numbers of the different deer.

TABLE V

Results of Counts

South of the Walls.

	Ox L	Ox R	Sheep L	Sheep R	Pig L	Pig R	Red	Fallow	Roe
Horn core	—		10		—		—	—	—
Skull	39		1 polled		—		—	—	—
			1 horned		—		—	—	—
Maxilla	31		4		1		1	—	1
Mandible	13(66)13		14(8)15		5(15)6		5	2	4
Teeth	453		60		80		12	—	2
Atlas	37		2		1		—	—	—
Axis	44		10		—		—	—	—
Other vertebrae	125		4		—		—	—	—
Scapula	180		8		4		—	1	—
Humerus P	23(25)		2 (2)		—(2)'		—	1	—
D	45		7		3				
Radius P	23(3)		6(3)		2(3)				
D	24		4		—		—	—	—
Ulna P	1(3)		2		—		—	—	—
D	1		—		—		—	—	—
Carpals	63		—						
Metacarpals P	92		—						
D	142		1		—		—	(4)	—
Pelvis	91		5		—		4	—	—
Femur P	30(3)								
D	29		5		2		5	3	—
Tibia P	14		3(5)		—		—	—	—
D	48		10		1		3	6	5
Calcaneum	63		4		1		2	3	—
Astragalus	82		3		2		1	5	—
Cuboid	64		1		—		—	—	—
Tarsals	51		—		—		—	—	—
Metatarsals P	138(1)		—		—		(1)	1(3)	1(1)
D	193		—		—		—	—	1
Metapodia	62		2		14		—	—	—
Phalanges A	89		—		2		—	—	—
B	54		—		1		—	—	—
C	18(6)17		—		—		—	1	—
Unidentified	1500		23		4				
Species total	4000		225		149		34	30	15

Total number of bones 4453			Total deer bones 79	
% number of bones	90	5	3	2
Meat kitchen annexe	81%	12%	5%	2%
Workshop range	75%	14%	7%	4%

Figures in brackets are either complete bones, shafts, or bones which could not be placed as either left or right.

4. The Ages at which the Animals were Killed.

There were a few small metapodia lacking epiphyses which were identified as ox because of their stoutness and which were presumably from calves (see Table VI). Some full-sized ox metapodia lacked epiphyses (fused at 15-16 months in sheep[2]) as well as a few other longbones. A few lamb bones were found. The age groups of the ox and sheep judged from teeth were as follows:—

	under two	at least two	at least five	about ten years
ox				
mandibles	1	23	34	5
molars	—	122	229	87
incisors	—	15	8	14
Total	1	160	271	106
sheep				
mandibles	2	21		
molars	—	11		
total	2	32	11 over two years but not very worn	

There was one **pig** mandible with 5 molars, 10 with the 6th molar erupting (18 months), 3 with 6 molars, and only one with worn molars. Of the pigs' teeth found free, very few showed any wear; these were mostly molars and possibly milk teeth. The incisors and canines showed little or no wear. Most of the pig bones had lost their epiphyses. Thus, as found last year, the sheep and ox bones were from mature or old animals whereas the pig bones were from young animals. The **deer** teeth were on the whole unworn, but none of the bones had lost their epiphyses. One of the Fallow mandibles had a molar erupting, and two of the Roe mandibles had teeth that were fairly worn. But there were too few deer finds to give a clear picture of their ages.

[2] Smith, R.N., *The Veterinary Record*, vol. 68 (1956), p. 257.

TABLE VI

Measurements of Metapodia in mm. (See Plate I)

	Length	Figures from Cornwall[3]	Proximal width	Distal width
Ox metacarpal	177	170 } celtic	52	53
metatarsal	209	190 } ox	48	53
	224	230 modern	53	67 (broad)
Calf metacarpal	c. 120		c. 25	c. 25
metatarsal	c. 150		c. 30	c. 30
Red deer metatarsal ...	283	300	31	39
Fallow deer metacarpal ...	c. 170	167	—	—
	—		26	—
	c. 180		26	—
	—		—	27
	196		28	30
	198		31	—
metatarsal	203	209	23	—
	c. 215		25	—
	—		26	—
	220		27	31
Red deer metacarpal ...	—		—	23
metatarsal ...	c. 120	185	19	—
	c. 120		20	—
	—		—	22
Sheep metacarpal	c. 110	146	22	—
	—		22	—
	113		23	26
	—		24	—

5. Size and Type of the Animals.

Measurements of the three complete **ox** metapodia (Plate viii (a) A.B.C.) are shown in Table VI. The metatarsal with the broad distal end is from an animal about the size of present-day cattle, whereas the smaller ox metapodia are from a smaller animal probably somewhat bigger than a Celtic ox. Many measurements were made of the widths of ox metapodia and the results are shown in the histograms in Fig. 18. Each series of measurements shows considerable variation. Broadness is probably that described last year, whereas narrowness may be due to poor nutrition. The metapodia complete their development early[4], and these could be permanently stunted in an animal receiving a poor diet during its early life[5]. Two peaks were sought in the frequencies of the different widths as an indication of sex difference, but in fact there seem to be three. A third peak is most noticeable among the distal ends of the metatarsals; the peaks lack clarity probably because of overlapping widths among types. The peak among the larger widths probably indicates bones from bulls, and the peak of the smaller widths is probably from cows. The middle one, apparently of greatest frequency, is probably from bullocks (castrated males). One would expect more males

[3] Cornwall, I.W. Bones for the Archaeologist (1956) pp. 155; 182.
[4] Hammond, J., *Growth and the Development of Mutton Qualities in the Sheep* (1932), pp. 224-243.
[5] Pálsson, H. and Vergés, J. B., *J. Agric. Sci.* vol. 42 (1952), pp. 1-92.

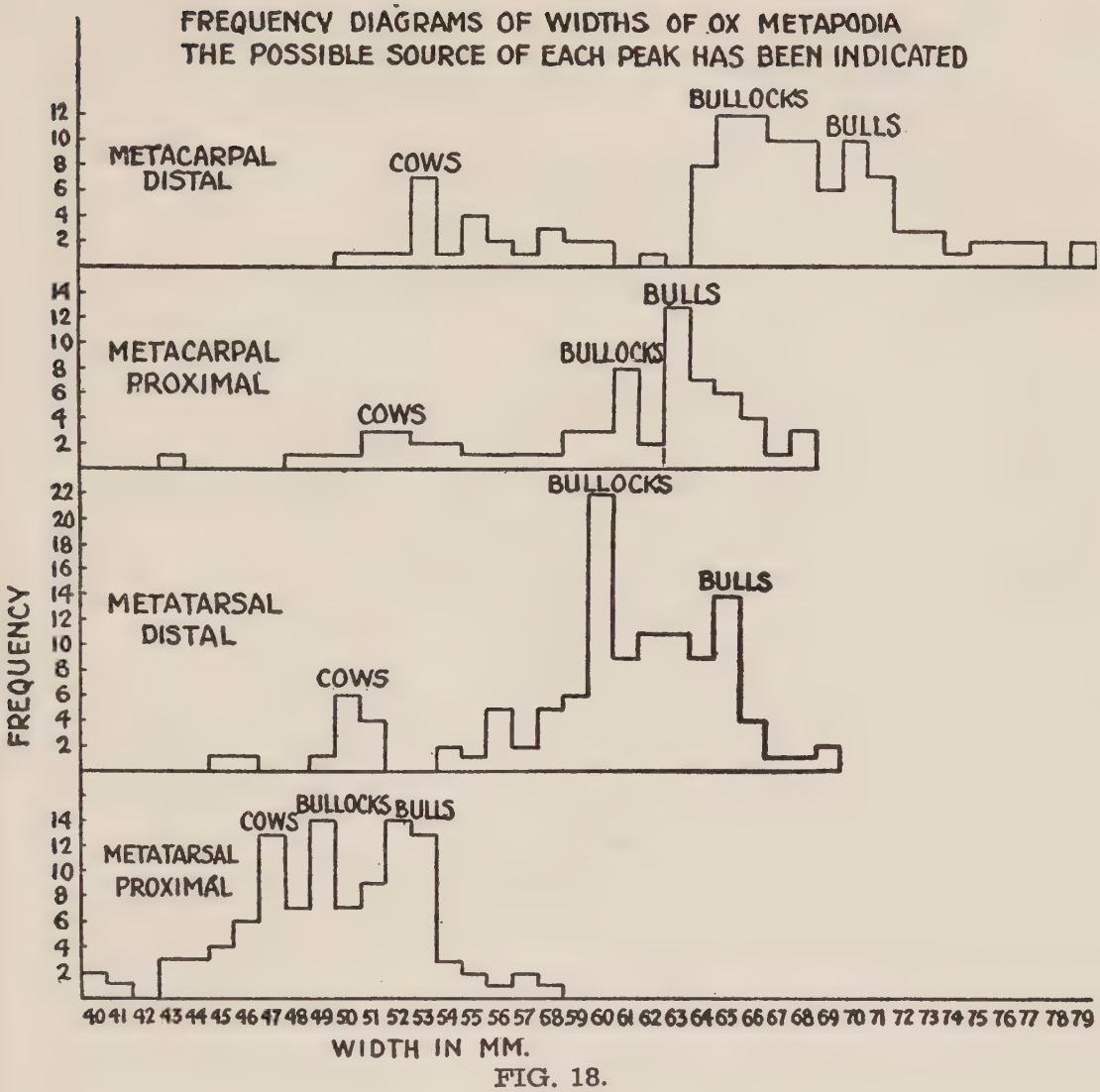


FIG. 18.

TABLE VII

Sheep Skull and Horn Core Measurements (mm.)

	Core length along anterior angle	(a) distance between horns	(b) supra-orbital foramina	lateral width	anterior/ posterior width
Plate 2B	(85	30	—	18	25
	(90			20	25
Plate 2D	(base	31	38	25	35
	(only			26	36
Modern Swaledale ewe about 18 mths	(115	41	45	24	32
	(115			22	31
	60			24	26
	70			19	25
	75			19	27
	100			18	27
	100			25	33
	125			30	30
	135			26	31
Plate 2A	(160+			36	49
	(160+			41	44

to be eaten, particularly bullocks (draught oxen and perhaps beef cattle), than females. In making these conclusions one has probably to assume that there are no great size differences due to breed.

Although negative evidence is rarely conclusive the complete absence of ox horn cores from this immense amount of ox material leads one to believe that these animals must have been polled.

The **sheep** bones were all smaller than those of present day animals and the long bones had the characteristic slenderness of unimproved animals[6]. The few measurements that could be made are shown in Tables VI and VII. The single complete metacarpal (Plate viii (a) I) seems to have a broad distal end, as have many of the ox metapodia (Plate viii (a), A). Dr. J. Wilfrid Jackson tells me that metapodia with broad distal ends are common in Iron Age and Romano-British sheep.

The upper parts of three skulls were found complete with horn cores. One had the typical slender horns of a ewe (Plate viii (b), B), and was identical with, although smaller than, the skull of a modern Swaledale (Table VII). The others had broader horns (Plate viii (b), D) and (Table VII) and were possibly from young rams or wethers (castrated males). Of 16 horn cores only 9 were complete enough to be measured (Table VII) and two of these were much heavier than the rest, being almost certainly from rams (Plate viii (b), A).

One hornless skull was found (Plate viii (b), C); this was smaller than those found last year but was perhaps from an immature animal. It would seem that horned sheep were predominant, and one might expect the finer--and sweeter--fleshed hill sheep to be eaten in preference to the larger-boned longwools. But the reason so few polled skulls have been found may be that a cranium lacking horn cores is readily broken and yields only unidentifiable fragments.

The depth of 15 mandibles at the 6th molar was measured and the results ranged from 26 to 33 mm. The most frequent value was 30 mm., and there was no evidence of a second peak among the measurements. The lengths of only four mandibles could be measured; two of these were about 150 and 155 mm. long respectively and the other two about 160 mm.

The **pig** bones were on the whole more slender and smaller than those of present-day animals. One slender metapodium was 100 mm. in length, whereas a stouter one was only 70 mm. long. There were tusks of three sizes (Plate viii (b), E,F.G.) and it is thought that the largest and the intermediate ones were from

[6] Hammond, J., *op. cit.* (1932), pp. 190-197.

boars and sows respectively. Even the largest were smaller than the tusks examined at the British Museum (Natural History), where tusks from wild and domestic pigs were of similar size. The third and smallest group of tusks consisted of four with a sharper curve, and with a groove on their mesial surface. Cornwall[7] describes the tusks from wild pigs as having a bead on the bucco-distal angle, and says that the faces are even concave. No bead was observed in the tusks from Kirkstall nor in those from wild pigs examined in the Natural History Museum. But the groove seen in the Kirkstall tusks might be homologous with the concavity described by Cornwall, and if so would suggest that the four small tusks were from wild pigs. The difference in shape is so striking that, if not from wild animals, they were almost certainly from a different kind of pig.

The **Red deer** bones were smaller than the reference bones with which they were compared at the Natural History Museum.

Discussion

Two important pieces of evidence have emerged this year which support the contention that almost all the bones are monastic. The first was the sheer enormity of the finds, and the second was the pocket of bones sealed beneath the 15th century drain. These were continuous with, and of the same character as, the rest of the dump, and show that the dump had begun to accumulate before the drain was made.

The area covered by the bones shows the vastness of the number present. If one takes their volume to be at a conservative estimate 500 cubic yards, and their density to be about 1,000 bones per cubic yard, with roughly 100 bones from an animal, one can estimate that the dump represents the remains of 5,000 animals. This total would be expected from an abbey during a hundred years, but not from a farm.

One can now obtain a clearer picture of the dump gradually accumulating in rough ground between the meat kitchen and the river, with the bones, intermingled with other rubbish, probably being covered with soil as they were deposited. That the bulk of the bones were not sealed means that a few of them could be later intrusions, e.g. rat and dog.

In general the finds confirm the conclusions of last year, and provide greater detail. Dr. J. Wilfrid Jackson tells me that the different mammal species have been found at Kirkstall in the same order of frequency as he found them in all the prehistoric sites he has examined. More evidence of the importance of fish and game in the diet was obtained from interesting finds: hare

[7] Cornwall, I. W., *op. cit.* (1956), p. 102.

was apparently eaten rather than rabbit, and a striking assortment of birds. It is of course not certain that all these were eaten, but of those found, only the jackdaw and kestrel live at Kirkstall today.

Bowden[8] has questioned the classical belief in the existence of long and short woolled sheep in the middle ages on the grounds that an increase in the supply of long wool could be associated with the later improvement of pasture. It is more likely that this increase of supply was associated with an increase in the number of longwoolled sheep and was not a direct effect of nutrition on wool growth as he implies. Trow-Smith[9] too, has recently discussed the tantalizing question of the origin of the longwoolled sheep, and suggests that the Romans might have introduced them.

That the longwools from a stock quite distinct from the Hill sheep is strongly suggested by recent work of Evans[10] on blood types; whereas in the Swaledale (hill sheep) 85% of the sheep were of one blood type, the Leicester longwool had no sheep of this blood type.

I have inspected some of the representations of sheep in the mediaeval illuminated manuscripts at the British Museum. One of these[11] showed polled sheep, a 12th century manuscript[12] showed horned sheep, and a 13th century one[13] showed horned and polled sheep together. Although it would be unwise to place too much reliance on the appearance of these sheep, it is doubtful whether artistic licence would allow omission of horns. And it is interesting that a sheep skull of date about 1300 which I examined from this year's dig at the deserted village of Wharram Percy, led by Mr. Maurice Beresford, was in fact polled.

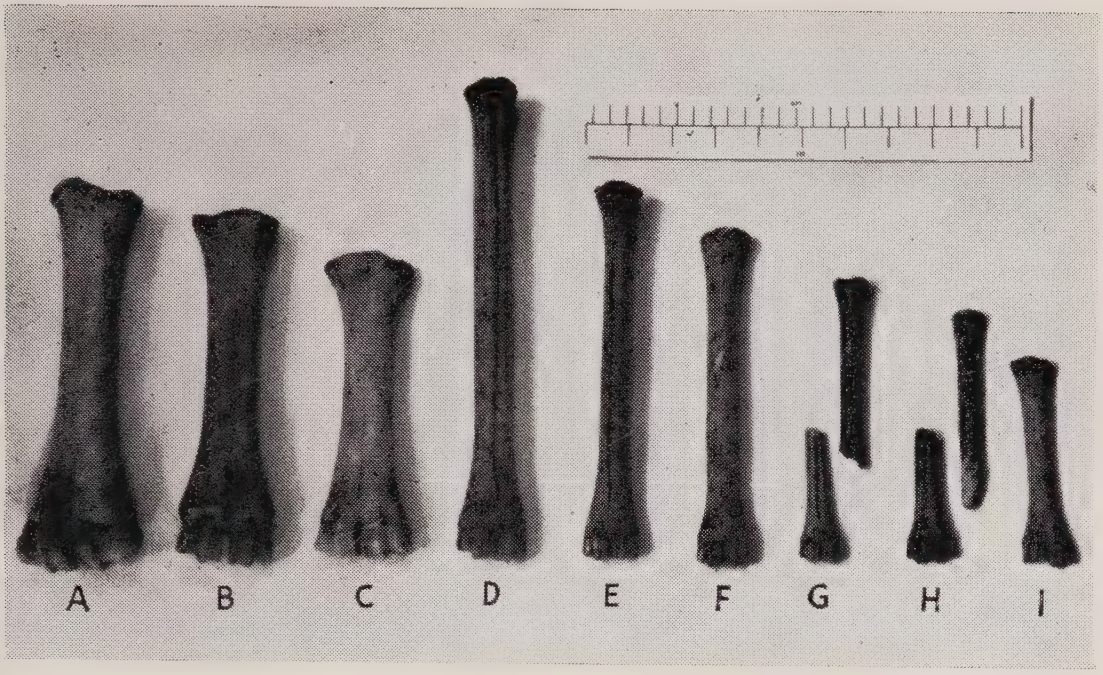
The inheritance of horns is complicated[14] but at Kirkstall one can almost certainly rule out breeds in which the rams are horned and the ewes polled, e.g., Welsh Mountain and Merino. In addition castration of males in a horned breed is unlikely to cause loss of horns, only a reduction of horn size towards that of the ewe[15]. Evidence supporting the existence in the Middle Ages of polled sheep that were probably long wools is therefore accumulating, although it is quite likely that they were outnumbered by horned shortwools.

8 Bowden, P. J., *Economic History Review,* 2nd series, vol. IX (1956), pp. 44-58.
9 Trow-Smith, R., *A History of British Livestock Husbandry to 1700* (1957), p. 165.
10 Evans, J. V., *The Advancement of Science,* vol. XIII (1956), pp. 198-200.
11 B.M. Harl, 603 f. 69b.
12 B.M Royal XIX f. 19.
13 B.M. Addl. 20787 f. 112b.
14 Rae, A. L., *Advances in Genetics,* vol. VIII (1956), pp. 203-205.
15 Fraser, A. S., *Australian J. Agric. Res.,* vol 6 (1955), pp. 770-5.

Acknowledgements:

I wish to thank Dr. A. S. Clarke of the Royal Scotitsh Museum for examining the fish and bird material, and Miss J. E. King of the British Museum (Natural History) for helping me to compare certain bones. I am very grateful to Mr. K. G. Towers of Leeds University for descriptions of the pathological conditions, to Mr. J. Armitage for taking the photographs, and to Mrs. C. V. Bellamy without whose help as an efficient recorder I would have been unable to do so much at the site.

PLATE VIII



(a) A and B. metatarsals, and C, metacarpal of ox; D, metatarsal of Red deer; E and F, G and H, metatarsals and metacarpals of Fallow deer and Roe deer respectively; I, metacarpal of sheep.

(b) A, horn core probably from ram; B, skull and horn cores probably from ewe; C, hornless sheep skull; D, skull and horn cores, possibly from young ram or wether; E, small tusk possibly from wild pig; F. tusk possibly from sow; G. tusk possibly from boar.

PLATE IX

AREA WEST OF THE CIRCULAR BUILDING

PLATE X

THE DEEPER DRAIN PASSING UNDER THE TROUGH DRAIN

Kirkstall Abbey Excavations

9th REPORT, 1958

by C. M. MITCHELL, F.S.A., F.M.A.,
and C. VINCENT BELLAMY, B.Sc.

1. INTRODUCTION

THE 1958 excavations were concerned with furthering the work carried out in 1957 in the area south of the meat-kitchen annexe and exploring a section of ground lying immediately west of the circular building discovered in 1956.

It was hoped that many of the problems associated with the walls and drains in the south area would be solved and that the west section would reveal more walls. The latter was suggested in the 8th report.

It was decided to grid the excavation areas and to this end datum lines were established as follows:—Starting from the outside corner of the refectory and meat-kitchen walls a line follows the refectory wall westwards for 100 feet, turns at right angles and goes 200 feet towards the river, then turns at right angles for 100 feet towards the east and finally at right angles for 200 feet back to the original corner. Permanent marks were placed at each corner.

The excavations were directed by Mr. C. M. Mitchell and Mr. Vincent Bellamy assisted by an able band of volunteers including Dr. David Owen and Mr. Maurice Greaves. Mrs. Jean Le Patourel took charge of the pottery, Dr. Michael Ryder made a further study of animal bones and Mr. John Armitage assisted with the photography.

STRUCTURES SOUTH OF THE MEAT-KITCHEN (by C. Vincent Bellamy, B.Sc.).

The 1957 excavations left a number of unsolved problems relating to the area immediately south of the meat-kitchen and its annexe.

The foundations of two lightly built walls seemed to represent the west and south sides of a single-storey building. The south wall (i.e. running east-west) carried the drain from the meat-kitchen trough. The eastern end of this wall was disturbed and in the disturbance a small drain cut across diagonally from the north-east to the south-west.[1]

This year a trench was sited to expose more of the small drain with a view to seeking its origin on the north side of the tarmacadam road.

[1] *Kirkstall Abbey Excavations,* Seventh Report (1956).

The drain was found to be rising steeply to the north-east and was traced back to the edge of the road. At this point the floor was four feet nine inches below present turf and the drain channel eight inches wide and seven inches deep. It was very similar in form to the drain from the monastic bath[2], floored and roofed with roughly shaped sandstone flags and with a single row of walling stones on either side. It fell six inches in the six foot length exposed and was surrounded and covered by the "bone-layer".

At the extreme north-eastern corner it rested on the lower level of gritty silt which contained bone in an advanced stage of decay. This lower section of the "bone-layer" has now been seen in several places. It contrasts sharply with the upper black soil containing well-preserved bones, and may indicate two separate periods of bone accumulation. To the south-west the drain rests in the medieval "made-ground" which has been associated with the establishment of a more southerly channel for the river[3].

A trench farther to the east was expected to reveal the continuation of the east/west wall but instead gave a very loose filling of heavy cobbles with the black soil and well-preserved bones of the upper "bone-layer". The removal of this loose fill revealed an area of flagged paving some two and a half to three feet wide and running from north to south (Plate IX). Towards the eastern edge of the paving a single row of stones rested on the flooring and gave a straight edge. The floor was of three or four layers of one-inch flags and rested on the lower "bone-layer" level. There was no sign of mortar either in the flag make-up or to secure the wall stones. Removal of the baulk showed traces of a similar edging of stones on the west side delimiting a paved walk or wide, shallow drain two to two and a half feet wide. Other trenches farther south strengthened the view that this was in fact a wide drain, falling gently southwards. From the lower bone-layer west of the paved section a piece of polychrome ware (face-mask), was recovered, and from the same level, but sealed by the flagging, some sherds of early 15th-century pottery (see page 98). The drain itself was filled and covered by the "black bone-layer" fill.

The drain (if such) had not been roofed, and there is nothing to suggest that it was deeper than the one row of walling stones implies.

The alignment of the deep, small drain in relation to this wider one, suggested they must meet just under the edge of the tarmacadam road. The danger of disturbing the foundations of the road limited our work here but we were able to establish that the small drain came to the edge of the wider one.

2 *Kirkstall Abbey Excavations,* Sixth Report (1955).
3 *Kirkstall Abbey Excavations,* Seventh Report (1956).

The wide drain was traced to a point twenty-five feet south of the road and continued further.

In the angle made by the association of these two drains a group of four stones seemed to be packing round a hole which possibly contained a wooden post. The socket so created is six by eight inches and the post could have been part of some timber structure. The post would rest on the "made ground" and the packing stones were in the lower "bone-layer" level.

The small drain was now traced in a south-westerly direction. It was found to swing more westerly and at thirty-five feet from the wide drain was running parallel to the east/west wall.

At this point it passes underneath the drain from the meat-kitchen trough[4] (Plate X). Its floor is six feet nine inches below present turf and rests on cobbles. The channel is here about five inches wide and nine to ten inches deep. It is in the medieval "made-ground" and no trench mark appeared. It would seem therefore, that this drain was laid before the old river course was filled in.

The excavation of this area also gave opportunity for the tracing of the trough drain one stage further. This has now been followed for sixty feet from the meat-kitchen annexe, and continues southwards. In the section exposed this year the character of the trough drain changes. Our earlier inspection of it showed a channel, eleven inches wide, of sandstone flag flooring, with the wall stones resting on the flags[5]. In the latest trench the walling on the eastern side was missing—the flag floor of the drain was much wider than before (up to four feet) and the walling on the west side was firmly built at the side of the flags and based four to six inches lower. At the southern edge of our trench the drain returned to its original form as it passed into the baulk with east and west walling stones laid on the flag floor giving an open channel about ten inches wide and nine to twelve inches deep, and five feet below the turf.

Throughout its length the trough drain is laid on the lower bone-layer and the upper bone-layer is packed against the sides and fills the channel. It would seem that the trough in the meat-kitchen annexe was no longer in use when the upper levels of the bone-layer were deposited, but the earlier levels of bones were in position when the drain was constructed.

DISCUSSION

The full sequence of development in this area is not yet clear, and more precise dating of the various structures must await further excavation.

It has been suggested that in the twelfth century the river Aire possibly flowed in two streams across the front of the

4 *Kirkstall Abbey Excavations,* Eighth Report (1957).
5 *Op. cit.*

Abbey or that it was much wider and slower running than is the case today[6].

The **timber jetty** belongs to this period and, if it was used to land stone for the building of the abbey, may be mid-twelfth century in date.

The **monastic bath** and its drain have been dated to the early thirteenth century and the drain clearly delivered the bath waters to the old river bank[7].

The **deeper drain** described this year is also heading for the same locality. It is at about the same depth as the bath drain, is falling through the "made ground" and it seems reasonable to suggest that its destination is the old river bank near the jetty. There is no firm dating evidence for this drain save the fact that at the higher end it is at the bottom of the bone-layer. It is certainly earlier than the drain from the meat-kitchen, and apparently earlier than the tipping of stony clay which constitutes the "made ground" near the jetty. Its origin is under the tarmacadam road or north of it. It was not seen when the south wall of the meat-kitchen annexe was excavated, but may be related to some structure at the southern end of the dorter range or to the early thirteenth century Abbot's Lodging. At its highest point it is three feet below the floor of the main abbey drain.

The **make-up** of the old river channel is later than the laying of the bath drain. One feels it ought to be later than the filling of the bath because the tipping of clay and stones in the jetty area must have reduced the efficiency of the bath drain. The bath itself was filled in in the early fifteenth century, and the "made ground" is possibly not earlier than that. Similarly if the earlier suppositions are sound, the filling of the old channel must affect the small drain followed this year.

The **wider drain** which runs southwards from the upper end of the small drain may have been built at this time to provide an alternative outlet for the water. Early fifteenth-century pottery was found sealed under its floor.

Walls were built on the newly created "made ground" but were demolished when the meat-kitchen was built in the late fifteenth century[8].

The **drain from the meat-kitchen** rests on the "lower bone-layer" level and passes over the remains of the east/west wall. It was no longer in use when the "upper bone-layer" fill was deposited. Like the wide drain it is not roofed and must have been on the surface of the ground.

6 *Kirkstall Abbey Excavations,* Seventh Report (1956).
7 *Kirkstall Abbey Excavations,* Sixth, Seventh and Eighth Reports (1955, 1956, 1957).
8 *Kirkstall Abbey Excavations,* Seventh Report (1956).

LONG SOUTH WALL

In 1957 the foundations of a wall running southwards from near the circular building were followed for seventy feet[9].

At its northern end the wall had been seen to be built on medieval "made-ground" which in turn covered the earlier jetty.

The wall was not quite parallel to the east and west walls of the refectory. Projection of its northern end would bring it to the circular building, but the true relationship is hidden by the tarmacadam road.

Additional trenches were dug this year to trace the southern continuation of this wall. These revealed that at eighty feet south of the road the wall turned sharply to the east in a firm corner. The eastward limb was traced for a total length of thirty feet without any sign of a return wall to the north.

In general character the eastward limb is of the same construction as the long southward section but is built on a foundation of heavy cobbles resting in blue river mud. For most of its length the wall still carried two or three courses above the offset level, but in an area about eight feet from the angle it appeared to have been breached and the disturbance penetrated through the offset course and affected the upper cobbles of the footings. The full extent of this disturbance was not determined. Part of it remained in the baulk between the trenches and time did not permit further examination of it this year. Whilst pottery was generally scarce at wall levels in this area a considerable number of sherds were gathered from the disturbed section. They appear to be of 15th century date. The disturbance might be related to the laying of the meat-kitchen drain. In the parts of these walls seen this year there was no sign of mortar. The interstices of the wall were filled with speckled brown clay which seems to be the same as the "made-ground" on which the north/south wall is built[10].

West of the angle of these walls a further wall was noted. This also came in at right angles to the north/south wall, was built up on to the offset course of this, but not bonded-in. It is of similar construction, not mortared, and somewhat narrower (about two feet three inches). It was not followed further this year.

SECTIONS

The previous work in the vicinity of the circular building and the jetty[11], had thrown some light on the nature of the ground south of the main buildings, and in pursuance of this enquiry it seemed desirable to take one of the more southerly trenches down to river-silt level. This was done in a trench south of the angle of the walls and the section is shown in Fig. 20.

[9] *Kirkstall Abbey Excavations,* Eighth Report (1957).
[10] *Op. cit.*
[11] *Op. cit.*

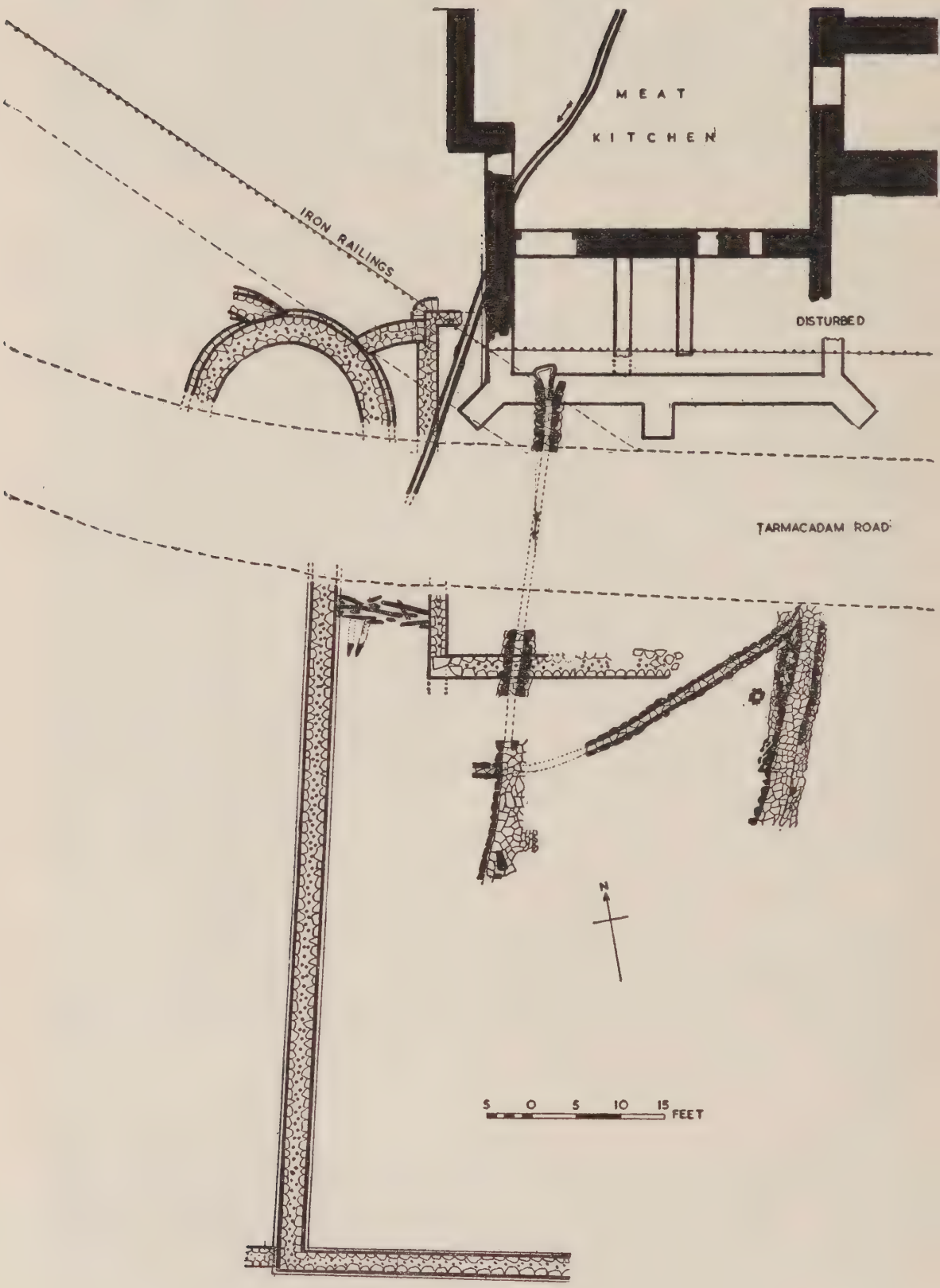

MEAT
KITCHEN
IRON RAILINGS
DISTURBED
TARMACADAM ROAD
N
5 0 5 10 15 FEET

FIG 19

The work was hampered here, as in all the trenches south of the road, by the high water table, only five feet below the surface of the lawn.

Blue river clay occurs north and south of the wall. It is at a higher level on the south and there is some evidence of a rising level on the line subsequently occupied by the wall. A foundation trench has been cut into the blue clay to receive the heavy cobble foundations of the wall itself. Spaces between the cobbles and the edge of the construction trench are filled with brown clay which is of the "made-ground". This make-up does not appear south of the wall. The wall itself has then been built and the brown clay banked against it, perhaps to exclude the river. Further north the "made-ground" carries the north/south wall but does not occur against the actual wall-face. The "bone-layer" lies on the "made-ground" but does not extend over the part which is banked against the south wall. A layer of fairly compact yellow clay-with-cobbles extends right across the section and contains modern pottery and bottle glass. On the north it is on the bone-layer—on the south it rests on blue clay. This same layer was seen to extend on to the remains of the north/south wall but did not occur west of that wall. The dark band above seems likely to be the old turf level before the lake was created. A bank of loosely packed clay and cobbles provides a southern bank for the skating lake and the comparable fill on the northern edge of the lake contained a penny of 1872 (Section drawing Fig. 20).

The skating lake was filled in about 1922 and the present lawn laid.

DISCUSSION

It now seems clear that these walls do not represent the remains of any building. The north/south wall is eighty feet long and the east/west wall has been followed for thirty feet. There seems no possibility of a return wall to the north until the east/west wall clears the trenches south of the meat-kitchen. This will represent a total width of at least seventy feet. The steep batter of the wall itself[12] would not imply any great height, and the absence of mortar strengthens the view that these are boundary walls enclosing perhaps, a kitchen garden.

The walls could not be built whilst the jetty was still in use because they rest on the "made-ground", but the section at the southern edge of the lake suggests that the making up of this ground and the building of the walls were one operation. The walls had been demolished when the black bone-layer was deposited.

The east/west wall is now about eighty feet from the river, but there is some ground for believing that the river extended to the wall when it was built.

[12] *Op. cit.*

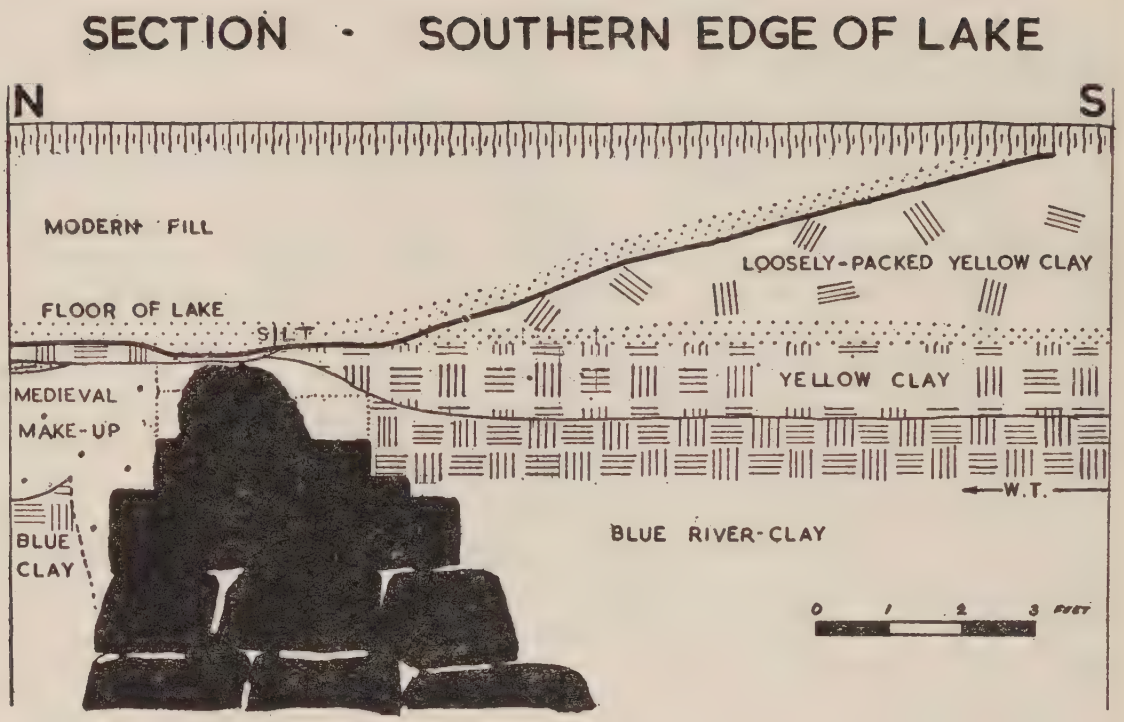

SECTION · SOUTHERN EDGE OF LAKE
N
S
MODERN FILL
LOOSELY-PACKED YELLOW CLAY
FLOOR OF LAKE
SILT
YELLOW CLAY
MEDIEVAL
MAKE-UP
W.T.
BLUE
CLAY
BLUE RIVER-CLAY
0 1 2 3 FEET

FIG. 20

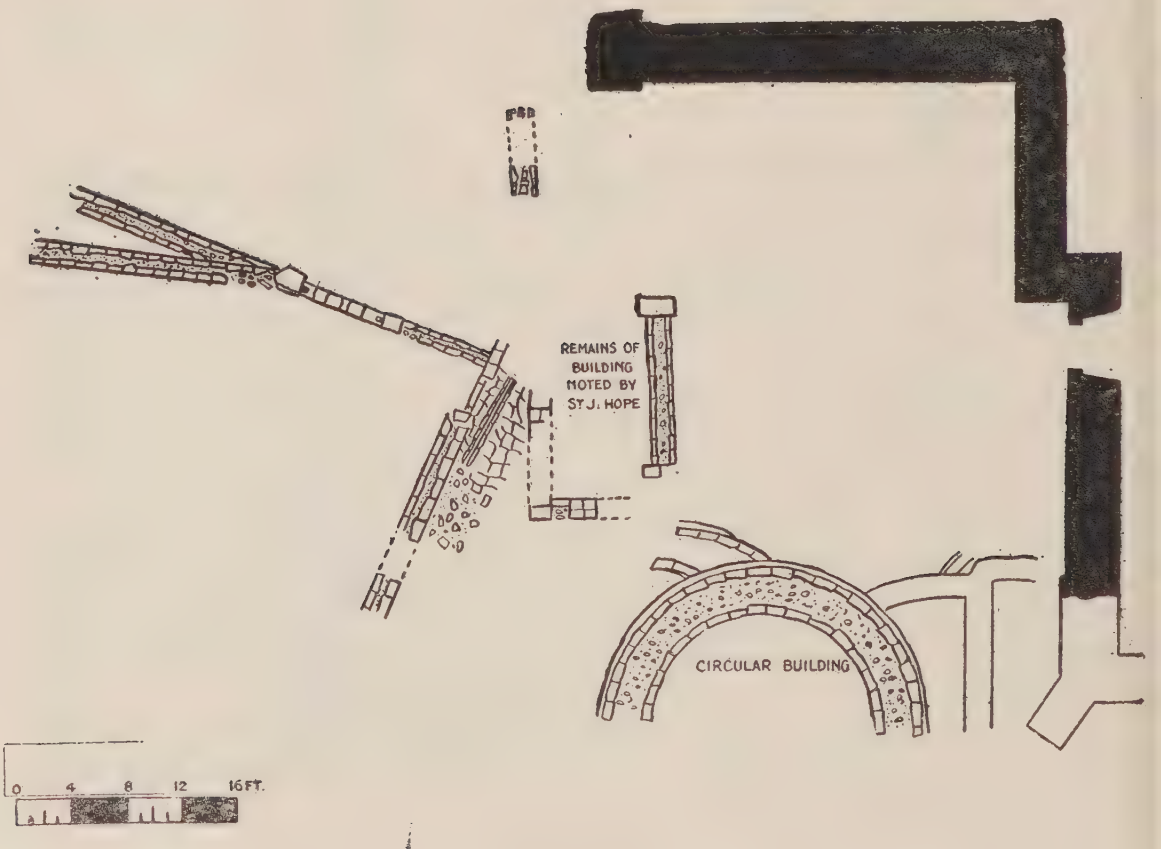

REMAINS OF
BUILDING
NOTED BY
ST J. HOPE
CIRCULAR BUILDING
0 4 8 12 16FT.

FIG. 21

It has been pointed out that the position of the jetty indicates a river level about the same as now prevails. Removal of the present dam would leave the jetty high and dry[13].

At the same time the water table this year (a wet summer) is higher than the small drain—which was under water for most of its length, and even the wider paved strip was a few inches under the water surface for the last ten feet.

The 1957 excavations coincided with a spell of dry weather and the water table was two feet lower.

WEST OF THE CIRCULAR BUILDING (by C. M. Mitchell, F.S.A., F.M.A.).

A trench ten feet by four feet and numbered W.R.9 was dug west of the site of the circular building found in 1956[1]. The north-east corner of this trench lay nineteen feet six inches on a line drawn at right angles from a point thirty-eight feet two inches on the north datum line and the south-east corner forty-three feet four inches on a line drawn at right angles from a point twenty-eight feet nine inches on the east datum line.

Turf and top soil were removed to a depth of one foot one inch. This layer contained miscellaneous pottery, metal, bones, etc., the pottery being mainly nineteenth-century. At the north end of the trench the tops of two large stones were exposed at a depth of one foot two inches and one foot six inches respectively. These jutted out some nine inches from the north face. Under the top soil there was a four-inch layer of brown sand covering the trench up to within three feet six inches of the north face. This contained no finds at all. From the end of this layer of brown sand to the north face was a fill of small stones, sandstones and gritty soil. This extended under the brown sandy layer and filled the whole trench. The depth of this layer was one foot seven inches. It contained both monastic and post-monastic pottery as well as a small quantity of bones and corroded nails.

At two feet three inches below the surface the tops of two walls were exposed. The first protruded five inches out of the east face at its north end and ran diagonally along the length of the trench to disappear into the east face at thirteen inches from its south end. It was composed of large blocks of dressed sandstone set in mortar. The second wall was of rough stones and rubble set in clay. It butted up at right angles against the first wall in the north-east corner and ran diagonally across the north face to disappear into the west face. The two stones previously noted rested on this wall but were subsequently removed.

13 *Kirkstall Abbey Excavations,* Eighth Report (1957).

1 *Kirkstall Abbey Excavations,* Seventh Report (1956), pp. 32-4.

SECTION - WEST WALL (WR 10)

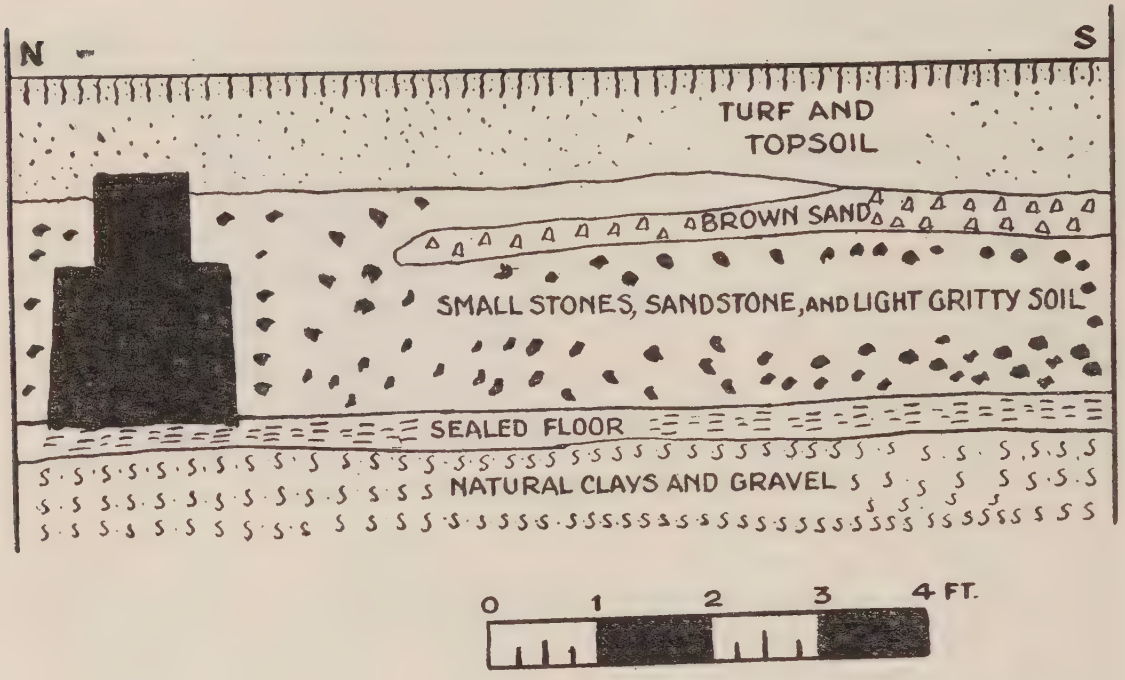


FIG. 22

ELEVATION OF DOORWAY - WEST WALL

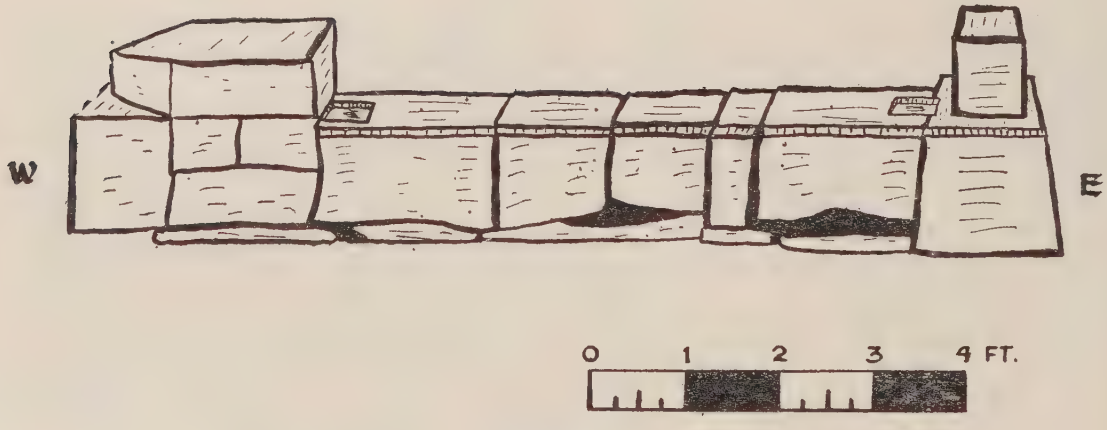


FIG. 23

The depth of both walls was ten inches. The one on the north face rested on a sealed floor of sand, gravel and mortar which extended all over the trench below the fill of stones, sandstone and gritty soil. This floor proved to be four inches deep and it contained no foreign material whatsoever. Resting on the floor at the south end were small flat pieces of sandstone, some of which showed signs of burning. Below the floor was a fill of light gravel some ten inches deep, which rested on natural clays and gravels.

In order to follow the second wall, four ten-foot by four-foot trenches numbered 10, 11, 12 and 13 were dug to the west of W.R.9 with three feet baulks between them. These baulks were subsequently removed. The results of this work were as follows:—

The composition of the soil layers in W.R.10 was similar to that of W.R.9, i.e., one foot two inches of turf and top soil, four inches of brown sand to within three feet six inches of the north end, one foot seven inches light fill of small stones, sandstones and gritty soil, four-inch floor of sand, gravel and mortar and then natural gravels and clays. (Fig. 22).

Starting about half way through the baulk W.R.10-11 the character of the soil changed. This was more apparent in W.R.11. Underneath the turf and top soil at the north end was a layer of dark soil and stones about two inches deep which gradually thickened until it reached a depth of nine inches at the south end. This layer went under the brown sand noted in the previous trenches. Underneath this dark layer was the light fill of small stones, sandstone and gritty soil previously noted. The layer of dark soil and stones gradually became thicker until finally, in trench W.R.13, it superseded the light fill.

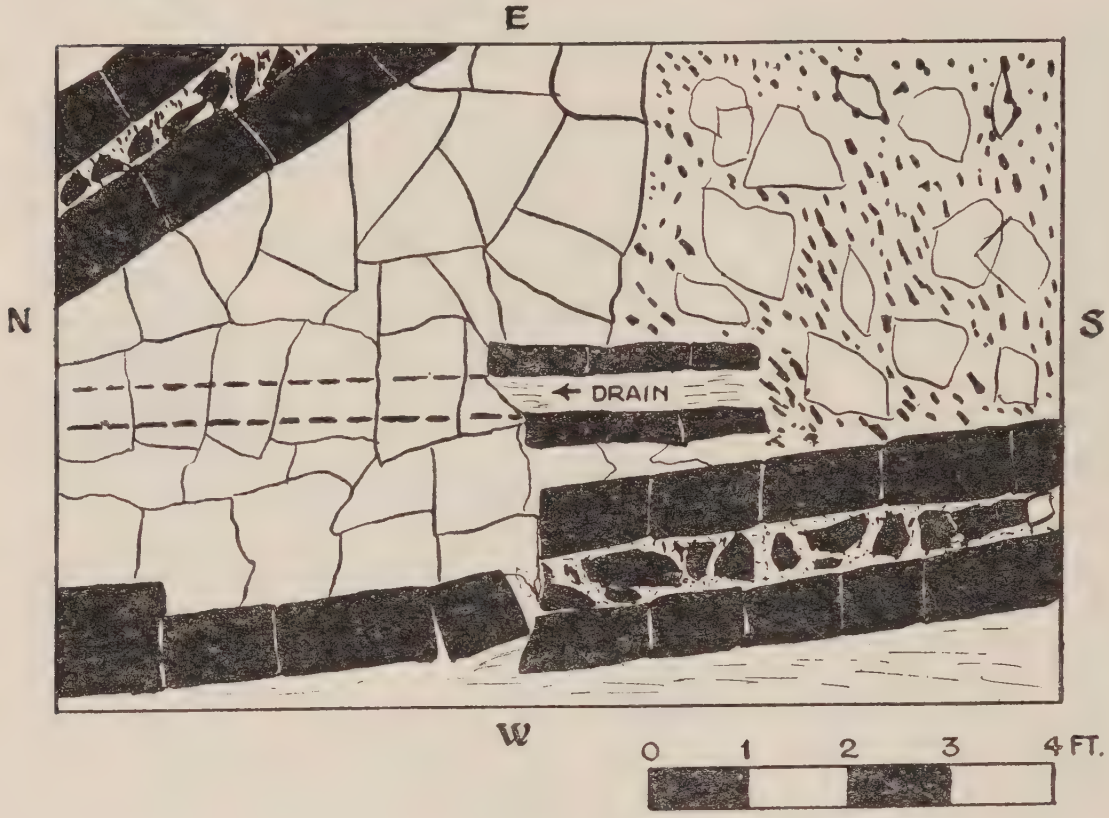
The layer of light brown sand was found in all trenches as was the sealed floor. Finds in all levels down to the sealed floor consisted of mixed monastic and post-monastic pottery as well as bones, nails and pieces of lead.

THE WEST WALL

The composition of the wall running west was as follows:—

Starting at its east end it was composed of rough stones and rubble set in clay for six feet eight inches. This section then butted up against a large dressed stone one foot five inches by one foot eight inches. This had a square hole cut out on its top side one inch deep. On top of this stone was another dressed stone ten inches square. The wall then continued for another six feet but it was made up of single, eleven-inch-wide blocks of dressed stone shaped on their south edges and with light slabs of sandstone underneath to act as footings. At the end of this run of wall there was another large stone similar to the one noted. This also had a square piece cut out on its top and

PLAN OF SOUTH WALL, DOORWAY, PAVED FLOOR, & DRAIN.



SECTION · NORTHERN EDGE OF LAKE

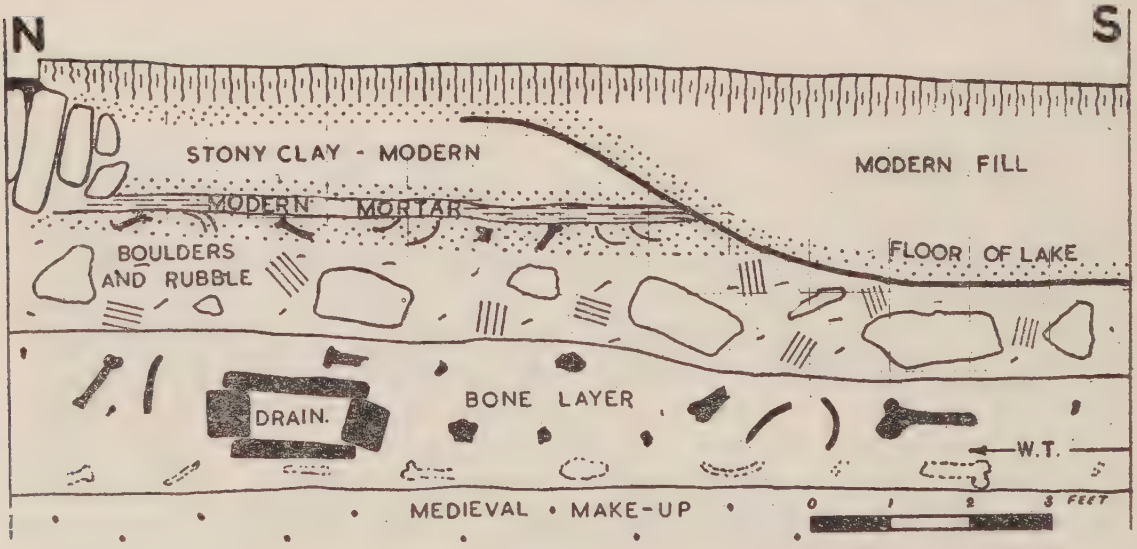


FIG. 24

another large stone resting on it. The whole of this section was bonded in mortar and its total length was nine feet six inches. (Fig. 23).

The wall continued to follow the same westward course but immediately beyond the nine foot six inch section mentioned above there was a short stretch of disturbance on its south side. This was due to a subsidiary wall joining the first one at this point and running off from it westwards at an angle of about fifteen degrees. At their junction this second wall lay on top of the first.

Each of these walls was composed of two parallel rows of ashlar-faced stone separated by a fill of rubble. The width of both walls was one foot nine inches but whereas the main one was bonded with mortar the second was set with clay. Both walls were exposed for a length of sixteen feet from their junction, and probing ascertained that they extended much farther than this. They both lay between one foot six inches and two feet below the surface.

SOUTH WALL

As previously mentioned this ran along the east face of W.R.9. In order to expose it fully the trench was extended two feet on its north, four feet on its south and six feet on its east faces. The result of this was as follows:—

Where it butted up at right angles against the west wall it was composed of three single blocks of ashlar-faced stone set in mortar. Each of these stones was approximately one foot six inches by twelve inches by twelve inches. Continuing southwards there was a three foot stretch composed of one large and two small shaped stones each nine inches wide. At the end of this stretch there was a large stone. Then followed a well-made wall, two feet thick, of two parallel rows of dressed stone with an inner core of rubble and not very substantial footings. This was set in mortar and was traced for fifteen feet southwards where it disappeared underneath the tarmacadam path.

Lying immediately behind the first thirteen foot stretch of the south wall, there was a paved floor composed of roughly shaped two inch thick slabs of sandstone. This was in very good condition at the north end but showed considerable disturbance towards the south. A small drain ran underneath this floor. It came out of the north wall of the trench extension towards the south and disappeared in the disturbed area. Underneath the paved floor it was intact and proved to be five inches wide and four inches deep lined with thick slabs of dressed stone. (Fig. 24).

The paved floor was two feet below the surface and covered the whole of the trench extension except where it was found to butt up against another wall running diagonally towards the

south across the N.E. corner of the trench. This wall lay one foot below the surface and was composed of large blocks of dressed stone set in mortar. Unfortunately there was not sufficient time to explore this wall thoroughly but probing and shallow excavation proved it to run nine feet nine inches southwards from the north side of the trench and then at right angles towards the east for at least five feet three inches.

DISCUSSION

Owing to lack of evidence it is impossible to prove the purpose of the walls and paved area or to establish their date. Unless future excavations produce the necessary evidence any conclusions must be purely conjectural. There are however certain hypotheses which can be drawn from a careful study of what little evidence there is.

In the first place it is reasonable to suppose from the width and make-up of the walls that they were not those of buildings. They are not thick enough nor have they sufficient footings. This particularly applies to the west subsidiary wall which was bonded with clay. The main west wall and the south wall are both very similar in make-up to those excavated south of the meat-kitchen[2] although they are not quite so wide. Both of these walls rest on a sealed floor of cement, sand and small stones, and it is a pity that this did not contain any finds.

WEST WALL

The end of this butts up against the south wall but is not keyed into it. For the first six feet eight inches it is made of rough stones and rubble set in clay. This section then butts up against a nine foot six inch length of what is undoubtedly a doorway; the single blocks of dressed stone being the doorstep and the large blocks on either side being the base of the jambs. The square holes found in the latter must have been used for taking the wooden uprights of a door frame. Following the doorway the main wall continues in a straight line towards the out wall of the lay brothers' rere-dorter. The subsidiary wall running off the main west wall is bonded in clay and since it runs over the top, must be of a later date.

We may therefore tentatively suggest that the main west wall with its doorway was at one time a curtain wall cutting off at least the area between the cellarium and refectory. At a later date, possibly post-monastic, the subsidiary wall was built. This may have been a boundary wall for a garden or field.

We must also ask how far the west wall extended eastwards towards the meat-kitchen. We know that where it butts up against the south wall it is composed of rough blocks set in clay.

2 *Kirkstall Abbey Excavations,* Eighth Report (1957), pp. 56-60.

We may suppose from this that at some time the original stretch of wall was demolished perhaps in order to build the south wall, and then afterwards roughly built up again, but until further excavation these problems cannot be solved.

SOUTH WALL

From its make-up and direction the south wall appears to be similar to those lying south of the meat-kitchen as mentioned in Mr. Bellamy's report. Although set in mortar it may have been another boundary wall as it does not appear to be substantial enough to have formed part of a building.

The three foot length immediately after its junction with the west wall seems to have been a small doorway. This supposition is supported by its general character and by the fact that the paved floor immediately behind is level with the top of the three stones forming the threshold.

The paved floor butts up against another wall on its eastern side. Examination of this wall on plan would indicate it to be part of the building noted but not excavated by St. John Hope[3]. The fact that the angles of the two walls are not the same as those shown by Hope may be due to the fact that he only noted the building and made no attempt to excavate it.

Nothing more can be said of the paved floor, drain or the building until further excavation has taken place.

THE POTTERY

by H. E. Jean Le Patourel, B.A.

Until this year's excavation there has not been sufficient evidence to show whether or not pottery was made at the Abbey. The indications that pointed to local manufacture for some of the domestic pottery were, first, the discovery from time to time of small glazed stones which might possibly have been kiln props; and second, the distorted and imperfect nature of some of the pottery, which suggested that the pots in question might be wasters. Neither of these indications was conclusive. It is too often assumed that the presence on a site of pottery marred in some way during the process of manufacture, and bearing such disfigurements as stacking rings on the base, or chips on the rim, or even a certain degree of misshapenness or 'dunting', is evidence of the presence of a nearby kiln, since it is held that such pots would never have gone into use, and so would not have travelled far from their place of origin. While in some cases this supposition is valid, since there is a degree of distortion which renders a vessel unusable, there is no doubt that minor irregularities were ignored during the Middle Ages. A sherd found this year, a piece of 'polychrome ware', made near

3 *Kirkstall Abbey Excavations,* Eighth Report (1957) p. 56.

Bordeaux, had a chip on its rim broken from the pot stacked above it in the kiln, but this had not prevented it from travelling more than eight hundred miles.

Certain sherds found this year were, however, wasters in the strictest sense of the term, since it is certain that the pots of which they formed part could never have been usable, and this has radically altered the position at Kirkstall. Some, at least, of the pottery used at the Abbey must have been made either within the precincts or very close by. This in itself is interesting enough, but a study of the ware involved and of its relationship to the general body of pottery found at Kirkstall, goes a long way to elucidate the origins of "Cistercian ware", that technically very highly developed cream and brown slipware of the later Middle Ages.

Of the significant sherds found this year, the first and most important was a small piece from a jug rim. The fabric was hard and smooth, free from grit, and firing in an oxidising kiln had produced a flower-pot red colouring. A splash of brownish green glaze had run over the rim, and over the fracture itself. This last could only have happened when the glaze was in a state of fusion, and in consequence the pot must actually have broken to pieces in the kiln in which it was being fired. In such a state it is unlikely to have travelled very far. A second rim found this year came from a pot which can never have been serviceable. In this case an unskilful potter had trapped air between two layers of clay when turning out his rim to thicken it. Expanding in the heat of the kiln this air had blown up the clay into great bubbles which obstructed the mouth too badly for the pot to be of any practical use. Though these two rims differ in colour, owing to different kiln conditions, they were made from the same ware, and this hard, smooth fabric, which must have been of local make, it is proposed to call, for convenience, Kirkstall ware B.

From the first excavation at Kirkstall it has been apparent that the pottery, broadly speaking, could be divided into two main categories according to the ware from which the pots were made. One of these was Kirkstall ware B, the other, relatively much more plentiful, was a gritty ware. This last was always well fired, sometimes fired extremely hard, the proportion of grit varying, but always considerable. This gritty ware it is proposed to call Kirkstall ware A. There is as yet no proof of its place of manufacture. There is a small proportion of pot-sherds which falls into neither of these two categories, but these generally come from outside the region altogether, from York, or even from outside England.

Kirkstall A is undoubtedly descended in unbroken tradition from the well-known and widely diffused gritty cooking pot ware of northern England in the twelfth century. At Kirkstall during

the following three centuries or so, shapes, rim formation, decoration, technique of finishing, all change, but the fabric itself, though often harder fired, remains fundamentally the same. True, the proportion of grit varies, but this appears to be a variation between pot and pot rather than between one period and another. For the present argument it is necessary to stress two forms of decorative treatment found occasionally in pots of this ware. First, from as early as the thirteenth century, pots were sometimes given a coat of light-coloured slip, either as a substitute for, or in addition to glaze. (e.g. Kirkstall Abbey 8th Report, Fig. 17, No. 2). Second, some pitchers were ornamented by applied strips and patches of light slip under a glaze. Sometimes these same pitchers were further decorated with incised markings, usually over the light coloured area. (e.g. Kirkstall Abbey 2nd Report, Fig. 7, No. 10).

Kirkstall ware A was always the predominant ware; it may or may not have been made at the Abbey. It remains to determine at what point it was joined by Kirkstall ware B, which certainly was made there.

The evidence for dating the beginnings of ware B depends partly on the nature of the fabric itself and partly on its presence or absence in several parts of the Abbey where stratification has been observed. There is a type of small jug (Fig. 25, No. 1), of which quite a few examples have been found in and around the city of York and which has been roughly dated by an example found at Skipton containing a coin-hoard. The latest coin is dated 1399, and as the pot is likely to have been buried soon after that year, it suggests the early part of the fifteenth century as a date for this type of pottery. Parts of these small jugs have been found from time to time during our excavations, and this season the remains of no less than three came from the same level as the glazed waster mentioned above. At Kirkstall these jugs are always in ware B, which is very similar to the fabric from which the other known examples of this type of pot are made. In view of the date of the Skipton pot, it seems likely that these vessels, and consequently Kirkstall B ware, were current in the early part of the fifteenth century.

Unfortunately it is impossible yet to trace the earlier history of Kirkstall ware B. It was apparently unknown in the thirteenth century; and the fourteenth century, during the course of which its introduction is most likely to have occurred, is the period for which we have least certainty at Kirkstall. For its later development there is rather more evidence. For this we must look to the pottery from under the meat-kitchen floor (Kirkstall Abbey 7th Report pp. 36-7), and to that from the infilling of the cistern outside the warming house (Kirkstall Abbey 2nd Report, p.21). Dark brown glaze came late to Kirkstall, and only a few sherds so glazed came from under the late fifteenth-

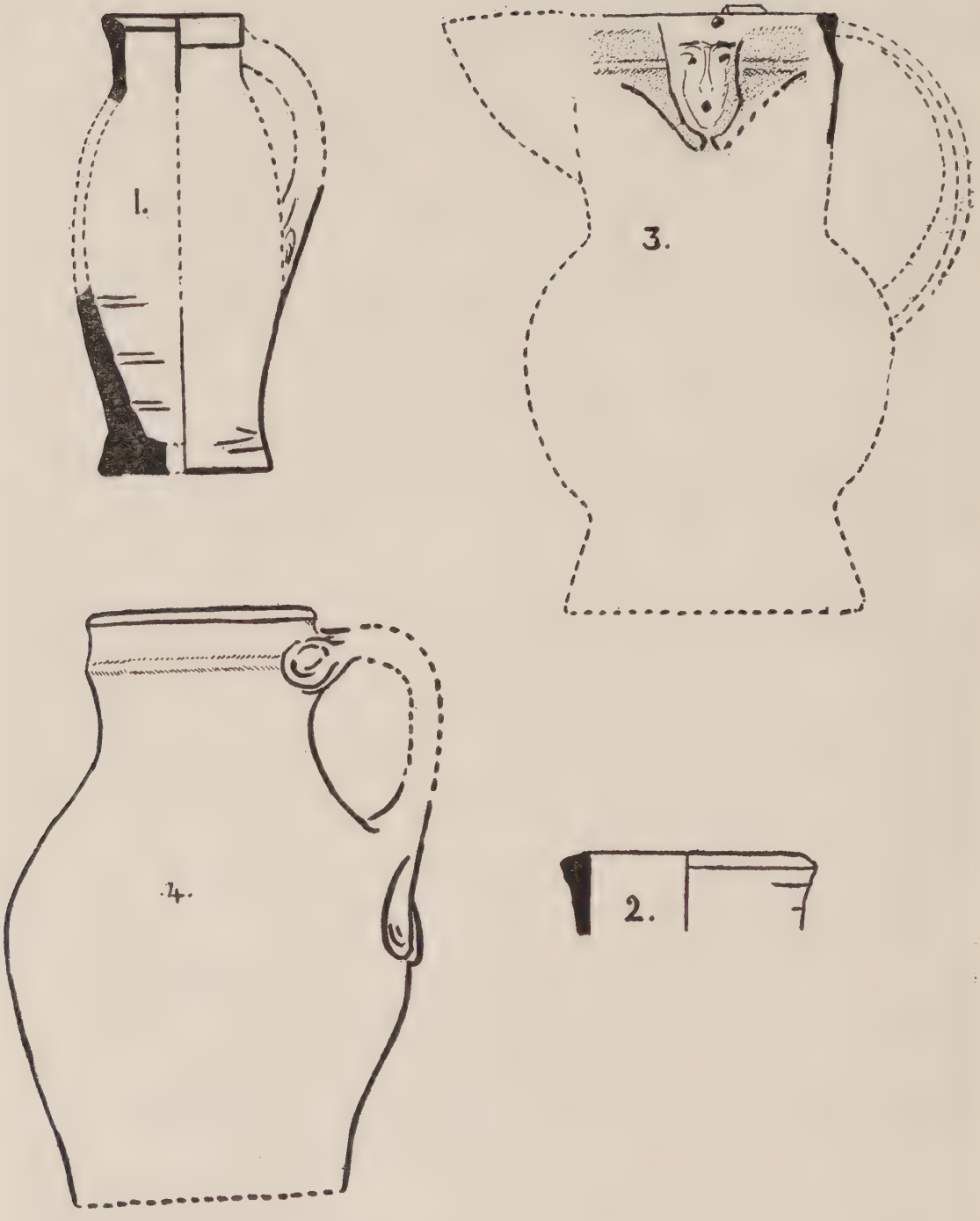


FIG. 25. POTTERY

century meat-kitchen floor, the cistern filling contained none and so probably antedated the building of the meat-kitchen. One pot from the cistern was in ware B, and from under the kitchen floor seven per cent were of this type. By the time the 'bone-layer' was laid down (Kirkstall Abbey 8th Report, Fig. 15), this percentage was more than doubled, though the picture is somewhat complicated by the fact that a lightly gritted type, intermediate between A and B, appears to have come into use. The incidence of ware B, then, rises gradually during the course of the fifteenth and early sixteenth centuries. Probably it was first introduced either round about the beginning of the fifteenth century or a little earlier. Nearly all the vessels known in this fabric are relatively small in size and it appears to be identical with the fabric from which "Cistercian ware" was made.

"Cistercian ware" was the name given by J. T. Micklethwaite to a type of dark brown pottery, elaborately decorated with cream trailed slip that he discovered on various Cistercian sites in the last years of the nineteenth century[1]. Cups and bowls, usually moulded to take lids, and generally with at least two handles, form the most usual type of vessel found. They are glazed on both surfaces, expertly made, and whatever their artistic merits, technically they are a great advance on the pottery that preceded them. Nothing is known of their origin, nor was it even certain, until a lucky find at Kirkstall in 1952, that this pottery was used in monastic times. After the vessels were thrown they were given a coat of slip which produced the characteristically rich dark brown background. A light cream slip was used to trail the decorative pattern over this dark slip and the whole was then covered with a transparent glaze.

It will be apparent from this description that all the elements necessary for making "Cistercian ware" were present at Kirkstall before the end of the fifteenth century. The fabric used appears indistinguishable from Kirkstall B, the techniques of slip coating and of decoration with light coloured slips were used on Kirkstall A; the use of manganese to obtain a dark brown was known by the time the meat-kitchen was built. Wherever the final step of combining the elements, and of trailing rather than laying the decorative slip was taken, by the sixteenth century this type of pottery was being made at a number of places. It is at least possible that Kirkstall was one of them.

The only other notable find this year was a delightful face mask from the rim of a French polychrome jug (see Plate XII). Such jugs were made in south-western France, in the neighbourhood of Bordeaux and are believed to have reached England with the Gascon wine trade[2]. Hitherto the pieces found in this country

[1] *Proc. Soc. Ant.* Vol. XV, 1893-5, pp. 5-9.

[2] For an account of polychrome ware see *Archaeologia* Vol. 83, 1933, pp. 124-134.

have been chiefly found in towns near the coast. At present there is no direct evidence of trading activity between Kirkstall and Bordeaux, though it is by no means unlikely that pottery may have come by such means. It is perhaps worth noting that on one occasion an Abbot of Kirkstall was in the neighbourhood of Bordeaux[3]. In 1287, Abbot Hugh, overwhelmed by the enormous debts of the monastery, undertook a journey into the depths of Gascony to petition the King on behalf of his house. He found Edward I at St. Sever. The polychrome jug might well have come back in the luggage of his retinue. At least the occasion fits well with the late thirteenth-century date usually assigned to polychrome pottery found in this country.

DESCRIPTION

1. Small red jug in Kirkstall ware B. There are one or two small spots of glaze on the outer surface. A similar base was illustrated in Kirkstall Abbey 5th Report (Fig. 24, No. 7). A similar jug found at Skipton, now in the Yorkshire Museum, York, dates the type to the late 14th or early 15th century. (Illustrated in J. D. A. Thompson, *Inventory of British Coin Hoards*, 1956. Plate IV).

2. Rim with glaze on fracture. Kirkstall B ware, red. Brownish green glaze.

3. Late thirteenth-century French polychrome ware. The fabric is fine, greyish white in colour, and the glaze good. The stippled area is coloured apple green, the outlining is in dark brown. Probably other colours were present on the body of the pot. A small puncture over the left eyebrow is a technical device to ease the firing of the thick pad of clay on which the face is modelled. Above it on the rim is a chip broken from the pot stacked above this one in the kiln.

4. Fifteenth or sixteenth-century jug in Kirkstall ware B, grey core, red surface where not covered with brownish green, rather worn glaze. The lower end of the handle joins the body with three firm thumb impressions.

REPORT ON THE ANIMAL REMAINS, 1958,

by M. L. Ryder, Ph.D., M.Sc., M.I.Biol.

Before the dig started it was decided to make no further study of bones from domestic animals, but instead to concentrate on any found from birds and small, i.e. wild mammals. There were already a number of these remaining from last year still to be identified. In fact far fewer bones were found than in the previous two years, probably because the trenches dug this year were on the fringes of the great bone dump. The meat-

[3] *Thoresby Society Publications* IV, 1895, pp. 189-193.

kitchen annexe series were on the eastern fringe, the workshop range series on the west and the wall series to the south. The extent of the dump has therefore now been roughly defined. The bones were of the same character as those found previously and so only those of particular interest will be detailed.

Horse: One complete metatarsal from the plus level in the workshop range area; this could of course be post-monastic but its measurements are recorded in Table I.

Sheep: One horn core, sharply pointed and fairly sharply curved; length along anterior angle 125mm; one fragment from hornless skull.

Fallow Deer: Measurements of 2 metatarsals in Table I.

Pig: A tusk was found with an unusual bend about 1cm. from its root end, suggesting that an injury had affected the growth. In addition there was an encrustation of bone around the part normally exposed in the mouth.

Hare: ulna, tibia, 2 metapodia.

Wild Bird: ?Teal—carpometacarpus; ?Wigeon—radius, tarsometatarsus; ?Woodpigeon—ulna; ?Black-headed Gull—carcoid, humerus; ?Starling—ulna; ?Kestrel—ulna.

Domestic Bird: Fowl—humerus x3, caracoid x2, femur x2, tibiotarsus, tarsometatarsus x2; Goose—mandible, caracoid, carpometacarpus, tibiotarsus, tarsometatarsus, phalanges x2; Duck—left and right radii; Pigeon—femur.

Fish: All of cod size; 2 skull bones (one first thought to be horn); 2 branchiostegal rays; 3 vertebrae with diameters of 13, 16, and 17mm.; 1 unidentified.

Shells: Few of oyster and mussel.

TABLE I.

Measurements of Metapodia in mm.

	Length	Proximal width	Distal width	
Horse metatarsal ...	260	50	49	(plus level)
Fallow deer metatarsal	218	25	29	
„ „	—	—	30	
Sheep metacarpal ...	c.110	—	—	
„ „ ...	—	—	21	
„ metatarsal ...	c.112	c.18	—	

DISCUSSION

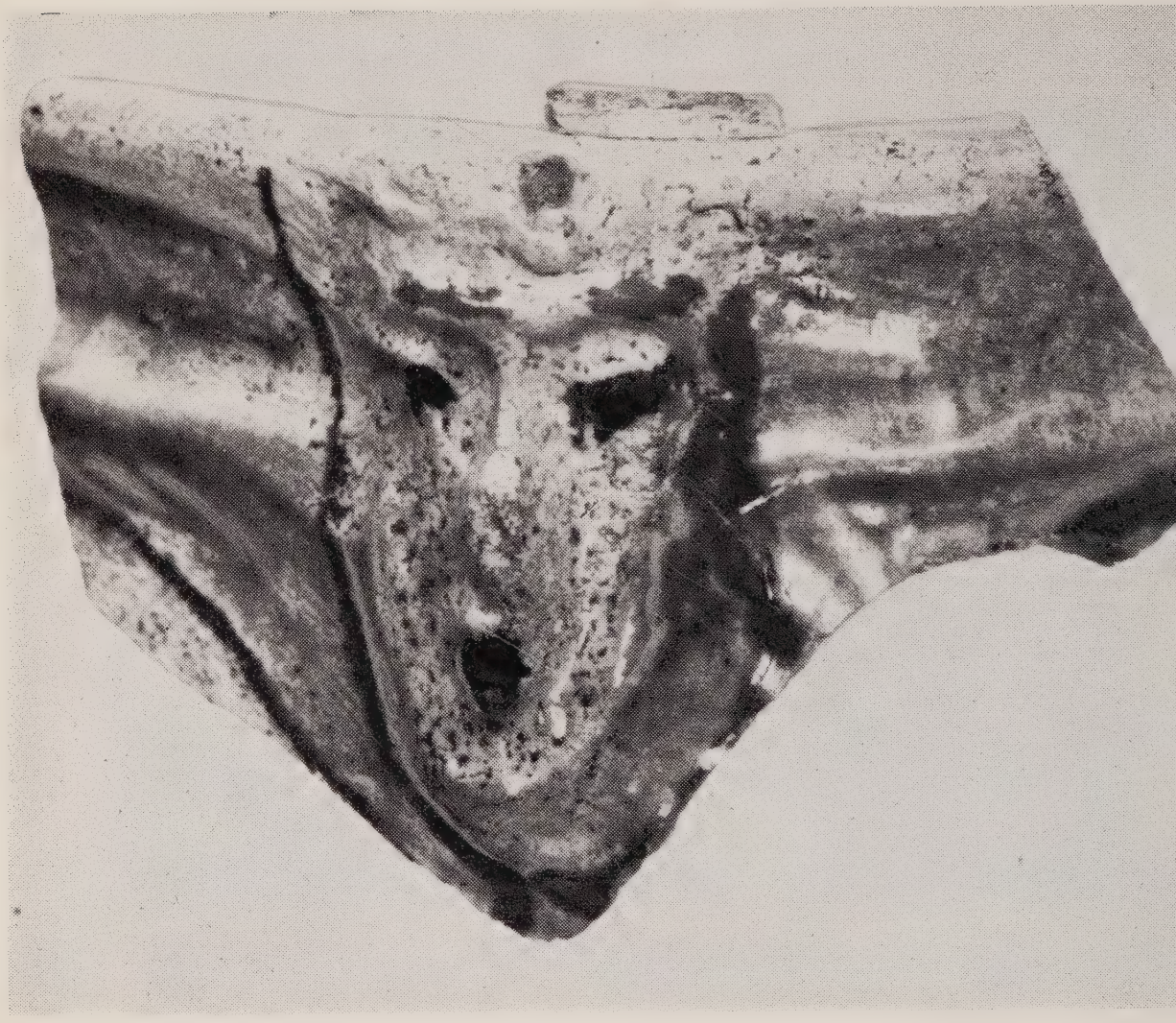
I have recently examined a large accumulation of ox horn cores associated with a medieval horner's shop found by Mr. L. P. Wenham during excavations in Petergate, York. These raised the question whether the cattle at Kirkstall, tentatively assumed last year to be hornless, were really horned, the lack of horn cores at Kirkstall being explained by their being sent to a horner.

I wish to point out that on p.71 of last year's report and on p.45 of the 1956 report the 7th molar of pigs has been erroneously described as the 6th. 6 and 6th should therefore read 7 and 7th. In addition, in Table VI on p.72 of last year's report, "Red Deer" appeared twice in error. The second mention should read "Roe Deer".

PLATE XI

THE WIDER DRAIN

PLATE XII



RIM OF FRENCH POLYCHROME JUG

PLATE XIII

WEST WALL—DOORWAY AND COBBLED FLOOR

PLATE XIV

WEST WALL—CAPPING STONES OF LARGE DRAIN

Kirkstall Abbey Excavations

10th REPORT, 1959

by C. VINCENT BELLAMY, B.Sc. and
C. M. MITCHELL, F.S.A., F.M.A.

INTRODUCTION

THE 1959 excavations carried on west of the circular buildings had exposed hitherto unsuspected walls and a paved area with a drain running through it. As the problems associated with these had not been solved and as their full extent was not known, it was, therefore, necessary to explore the area again this year and to try and trace the newly-found walls farther to the west. It was also decided to investigate the building noted by St. John Hope.

Work in the south area of the refectory and meat-kitchen, and south of the modern tarmacadam road, was not completed in 1958, and nothing further was done there this season. The reason for this was the finding of more walls and of the drain north of the road and south of the main kitchen, and these must eventually be sought on the south side of the road. It therefore seemed advisable to wait for the completion of that section before opening new trenches in the large lawn.

Instead it was decided to use one group of volunteers to explore the Monks' infirmary, an area not expected to produce any major problems but which might yield pottery which could be closely dated.

The excavations were carried out under the direction of Mr. C.M. Mitchell and Mr. C. Vincent Bellamy. They were assisted by a band of volunteers including Mr. William Nicholson, Mr. Kenneth Wilson and Mr. Maurice Greaves. Mrs. Jean Le Patourel took charge of the pottery and Dr. Michael Ryder made a further study of the animal bones.

PAVED AREA AND BUILDING NOTED BY ST. JOHN HOPE (by C. M. Mitchell, F.S.A., F.M.A.).

As a result of finding the paved floor and drain and the supposed wall foundations of the building noted by St. John Hope,[1] it was decided to explore this area thoroughly.

A trench twelve feet by eighteen feet was dug so that its west face would expose part of the south wall. The south-west corner of this trench lay thirty-two feet on a line drawn at right angles from a point thirty-five feet one inch on the north datum line,[2] and the south-east corner thirty-seven feet ten inches on a

1 *Kirkstall Abbey Excavations*, Ninth Report (1958) p.93.

2 *Ibid.* p.79.

line drawn at right angles from a point fifteen feet ten inches on the same datum line.

The excavation of this trench was initially confined to the area of the paved floor and drain. When the floor was removed in the northern half of the trench, it was found to rest on a four-inch layer of packed earth, clay and small stones containing fragments of miscellaneous pottery. Underneath this layer was another floor composed of roughly shaped two-inch thick flags of sandstone. In parts, this extended underneath the south wall. Towards the east, however, it was broken up just in front of St. John Hope's building. The walls of the drain were bedded on to this floor with mortar; it was roofed over by the upper floor paving.

The disturbed area in the southern half of the trench was of a similar make-up to the layer underneath the floor at the north end, plus broken pieces of floor paving. Beneath it lay the second floor described above. It was seen that the course of the drain had been altered at some time, so that it no longer ran towards the south wall but had been curved slightly to run parallel with it. Where the alteration in its course occurred, the floor of the drain began to slope downwards toward the south end of the trench. Here the walls of the drain were considerably disturbed and several sections were missing. Where it entered the south face of the trench, however, it was intact, its floor being made up of two three-inch thick carefully shaped flag stones. These flags were taken up and found to be resting on packed earth and clay, intermingled with small stones. One or two pieces of the twelfth and thirteenth-century pottery were found in this. The whole of the second floor was then removed and it was found to rest on a four to five-inch floor of small stones, sand, gravel and mortar. Similar pottery was obtained from this. Underneath, was a six-inch fill of gravel and small stones, containing several pieces of twelfth and thirteenth-century pottery; then followed natural gravels.

BUILDING NOTED BY ST. JOHN HOPE (Fig. 26)

Following the investigation of the above section, the remainder of the eighteen-feet by twelve-feet trench was then excavated in order to expose the foundations of the building noted by St. John Hope. The west wall of this came out of the north face of the trench four feet six inches from its north-west corner. Composed of two parallel rows of dressed stone set in mortar directly on to a rubble base, it was one foot nine inches wide and ran diagonally towards the south-east at an angle of seventy degrees for a distance of seven feet eight inches; its end being a large well-dressed block of stone measuring three feet three inches by one foot nine inches. Running off at right-angles towards the east from this block of stone, was the second

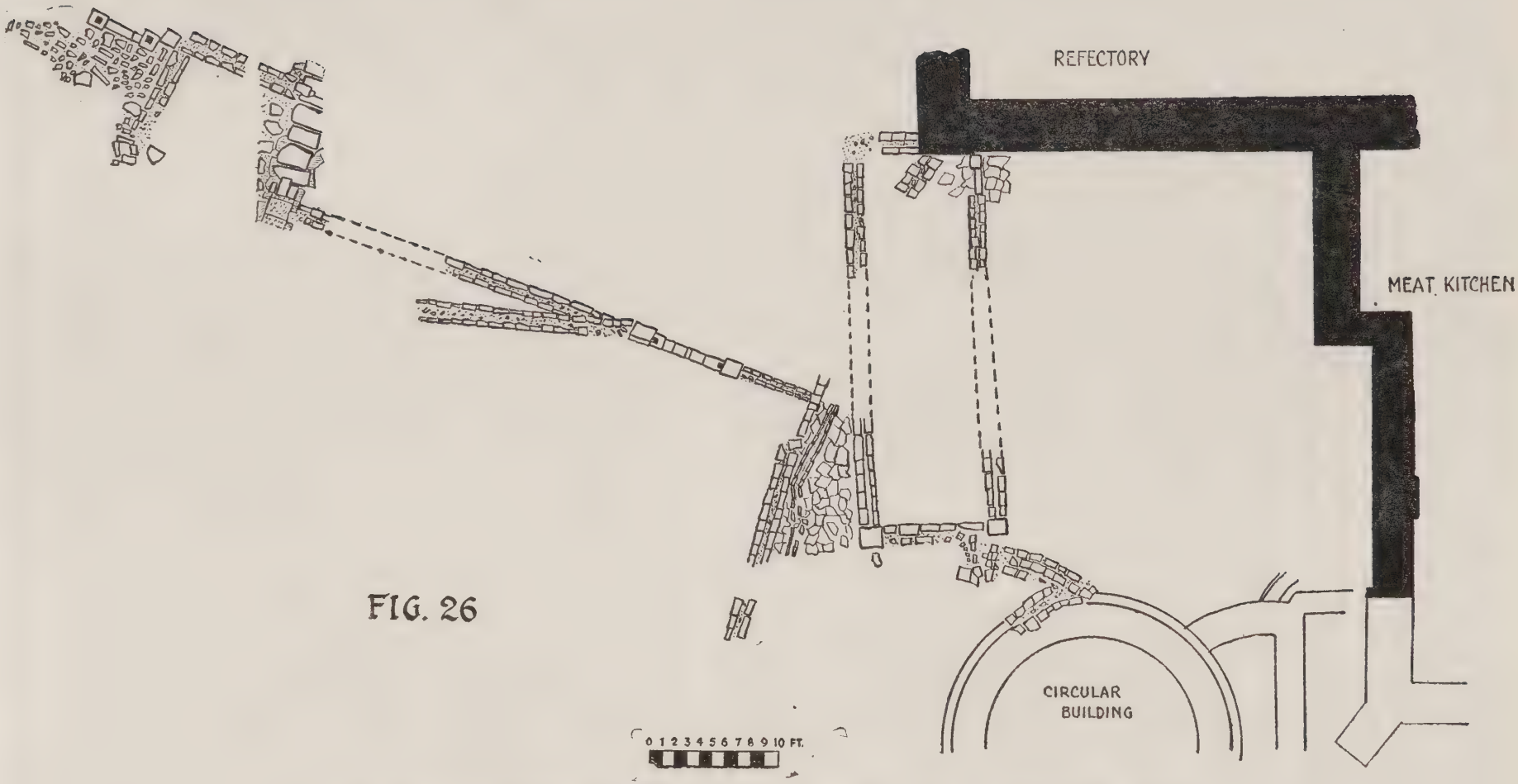


FIG. 26

PLAN OF ST. JOHN HOPE'S BUILDING AND WALL RUNNING WEST

wall, similarly composed except that it had been robbed in places. This wall was one foot six inches long and ended in another block of stone similar to the one described. The next wall of the building then ran at right-angles from this stone towards the north. These three walls are all of a similar make-up, being set in mortar with no footings. They lie between nine and twelve inches under the surface.

The make-up of the ground inside these walls was as follows:

Turf and top soil to a depth of nine inches contained miscellaneous pottery, metal and bones, the pottery being mainly nineteenth century. Underneath this was a fill of rubble and light gritty soil varying in depth from seven inches at the north, to one foot three inches at the south end. The finds in this were similar to those in the top soil. Then followed a seven-inch stratum similar to the one above but much heavier, as it contained large pieces of stone. Miscellaneous pottery and bones were removed from this. The fourth layer consisted of a mixture of soil and clay containing small pieces of stone and fragments of mixed pottery. It varied between three and four inches in depth. Packed earth, clay and large and small pieces of stone followed this layer, varying in depth from one foot two inches at the north end to six inches at the south. This also yielded mixed pottery. This level was found to be resting on a five-inch floor composed of sand, gravel, mortar and clay. Underneath this was a six-inch layer of stones and gravel and then natural gravels.

The composition of the ground to the south and east of the building walls was similar in make-up to that in the building itself, except that there was a disturbed area starting about seven feet three inches on the south wall and running eastwards. Excavation showed this to be the site of the circular building excavated in 1956.[3] In order to re-examine a section of this building and its position in relation to the one under review the trench was extended towards the east.

By means of probing, the east and west walls were traced back towards the refectory. It was found that the east wall met the refectory wall. In order to explore this area more thoroughly a trench fifteen feet by ten feet was laid down. The north-east corner of this lay at a point twenty-one feet nine inches on the north datum line, i.e. the refectory wall. The east side of the trench came off at right-angles from this point towards the south for a distance of ten feet, the south side then running at right-angles for fifteen feet towards the west. A four-inch layer of turf and top soil was removed. This contained fragments of monastic and nineteenth-century pottery, bones and nails, etc. Underneath, there was a seven to eight-inch fill of gritty soil,

[3] *Kirkstall Abbey Excavations,* Seventh Report (1956), p.32.

large and small stones, and fragments of paving stones. It yielded the same sort of finds as in the top soil.

Both walls of the building were fully exposed and found to be of exactly the same make-up as their continuation towards the south, with the exception that there were two courses instead of one, and the top course had been knocked out of alignment with the bottom course in several places. Both walls lay between ten and twelve inches under the surface.

The east wall butted up against the refectory wall but was not keyed into it. Where it met the refectory wall, it was composed of a large single block of stone similar to those on the south-east and south-west corners. Leading on to this large stone, was a two-foot by one-foot well-dressed stone, which looked as though it had formed part of a threshold. On a level, and lying on both sides of this were two short areas of flagged floor.

The west wall finished abruptly after running out seven feet six inches from the south wall of the trench. It was replaced by a back fill of heavy stones and soil. This was no doubt the wall and post-hole found in the exploratory trench laid in 1957.[4]

The last five feet of the refectory south wall formed part of the north wall of the building. This had been extended towards the west, by a three foot stretch similar in make-up to the other three walls. This extension butted up against the west wall of the refectory, its inner face being flush with the corner of the refectory walls. Where this extension wall should have met the west wall of the building, there was a gap, caused no doubt by the exploratory trench already mentioned.

After clearing the tops of all these walls, the interior of the building was dug. After the removal of the short area of flagged floor, the make-up of the ground consisted of a very heavy filling of large and medium size stones and soil, overlaid with mortar. This layer went down for eighteen inches and rested on a hard beaten floor composed of a mixture of sand, small stones and clay. It contained broken tiles and miscellaneous pottery. Time did not permit further excavations. A similar make-up occurred on the areas immediately outside the walls.

Within the building itself, another wall was struck at a depth of one foot ten inches. This ran off from the refectory wall at an angle of one hundred and sixty degrees towards the south-west. It butted up against the refectory walls, the end of its west face meeting the south-west corner of the refectory. It rested on the hard floor lying underneath the heavy filling and was composed of large irregular blocks of stone.

DISCUSSION

It was hoped that this year's excavation would give some idea as to the purpose and date of the paved floor and drain, and

[4] *Kirkstall Abbey Excavations,* Eighth Report (1957), p.56.

would also provide evidence as to the date of the south wall. Unfortunately it has not proved possible to determine either of these except in very general terms.

From the evidence it would appear that the following sequence of events applies to this area. Sometime during the twelfth or thirteenth centuries a hard-packed floor of stone, mortar, clay and small stones was laid down on a foundation of gravel and small stones. This is assumed from the fact that pottery of this date came from these two layers which were sealed by the paved floor lying on top of them. These layers went underneath the south floor and had been noted in trench W.R.9.[5] They were traced toward the east up to the walls of St. John Hope's building and also inside it.

At a later date paving was laid on top of these layers. This went under the south wall. It may also have extended eastwards underneath the wall of the building noted by Hope, but proof of this is lacking.

Later still the paved floor itself was covered with a layer of packed earth, clay and small stones and the drain laid down in it. The area was then covered over with a final floor of paving. The south wall was then built and the course of the drain altered to run directly south instead of south-west. As this final floor butted up against the wall of St. John Hope's building it may be surmised that it was laid down after this was built. If this is correct it establishes the building as monastic.

There was not sufficient time to trace either the drain or the south wall but it is hoped to do this sometime in the future.

The result of the exploration of the building noted by St. John Hope was equally barren of any definite dating, but there is the possibility of such evidence being found in the future, as the north end of the building was not fully excavated.

There are, however, certain salient features about the building which should be considered. In the first place it was a rectangular structure measuring thirty-two feet by eleven feet six inches with one foot nine inch walls set in mortar. It had a doorway on the east wall at the refectory end. From the manner in which the east and north walls butt up against the refectory wall it must have been built later than the refectory, i.e. after the twelfth century. It is very likely that the paving at the north end of the building once extended over the whole floor.

With regard to the wall found within the building at the north end, further exploration may elucidate its purpose. It is, however, highly probable that this wall is earlier than the walls of the rectangular building as they are at a somewhat lower level.

[5] *Kirkstall Abbey Excavations,* Ninth Report (1958), p.89.

On St. John Hope's plan[6] the building is not shown as rectangular but this is no doubt due to the fact that he only noted the existence of the walls and probably did not measure them.

THE WEST WALL

In order to follow the west wall found in 1958[7] a trench W.R. 13A was opened between points seventy-eight feet and eighty-three feet on the north datum line and at right angles to it. The trench, excavated originally for six feet south of the datum line, was afterwards extended seven feet to the north and measured in all thirteen feet by five feet.

Underneath six feet nine inches of turf and topsoil a filling of black earth and stones extended to a depth of about three feet at the north end of the trench and three feet six inches at the south. This contained fragments of modern and early pottery, nails and animal bones. A foot below the surface in the south-east corner of the trench a section of walling was found. So far as could be seen its direction and make-up are similar to those sections found further to the east in 1958, but it had been broken or had fallen down some two feet from the east face of the trench.

Across the middle of the trench a single course of stone walling was found nine inches below the surface. This course was two feet wide and from four inches to six inches deep. As it was clearly of recent date it was removed.

At the north-west corner of the trench about two feet six inches below the surface, the foundations of another wall were uncovered. Consisting of two parallel courses of stones it was nine inches deep and eighteen inches wide and rested on clay and broken tiles; it only extended three feet into the trench, at which point it was broken down. The continuation of this wall to the west was uncovered in trench W.R. 14 (Page 110). Its general direction is N.W.-S.E., roughly parallel to that of the west wall mentioned above.

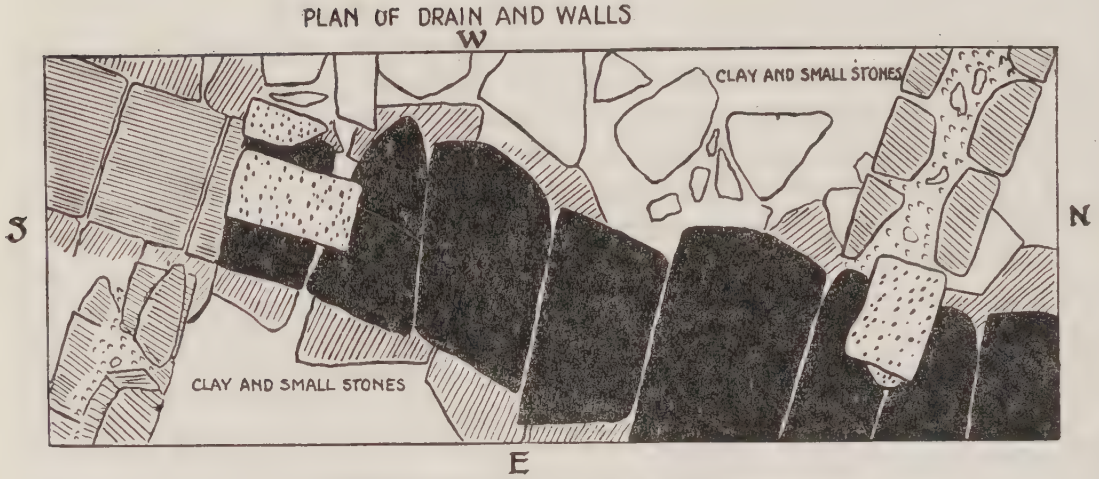
Running from the north-east corner of the trench to the south-west corner a ten-foot run of seven large rough-hewn stones was found at a depth of three feet to three feet six inches, some of these stones being nearly three feet long by two feet wide. (Fig. 27). They subsequently proved to be the capping stones of a very large well-made drain about the same size as the main drain of the Abbey. Resting on the third of these stones and adjacent to the wall foundations mentioned in the preceding paragraphs was a large rectangular stone. At the end of the run of these cappings was another dressed rectangular stone.

[6] Shown in the Historical Ground Plan, in *Thoresby Society Publications* XVI. 1907.

[7] *Kirkstall Abbey Excavations,* Ninth Report (1958), p.89.

WR 13A

PLAN OF DRAIN AND WALLS



SECTION ALONG EAST FACE OF DRAIN

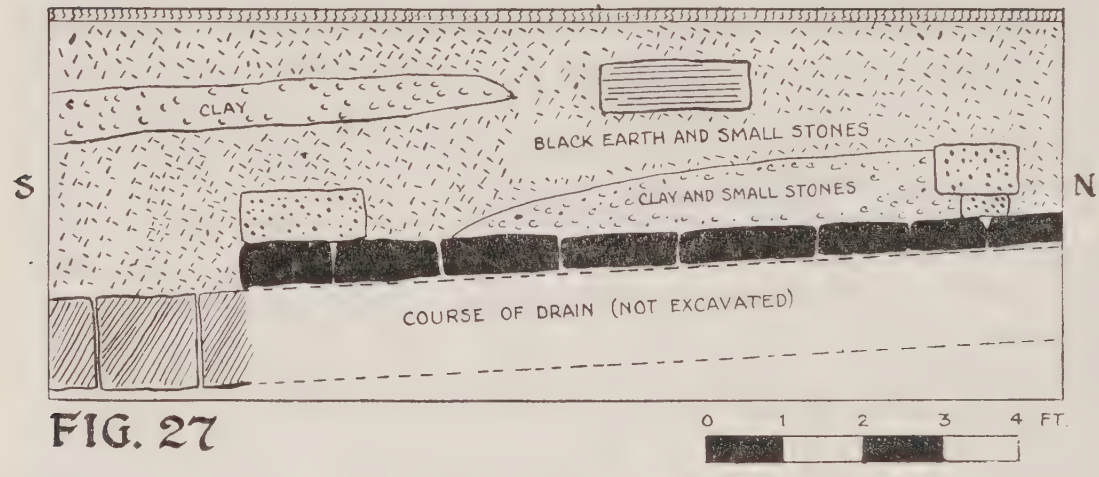


FIG. 27

WEST RANGE 13A

This did not properly span the drain, being wedged against the edges of the side stones. A further rectangular dressed stone one foot by one foot six inches and a smaller stone lay on top of this and all were bonded to it with clay. From this point to the south face of the trench the drain was not covered. It was filled with gritty brown earth, small stones, broken tiles and a large rectangular dressed stone. Two fragments of sixteenth-century pottery were also found. This filling continued under the covered part of the drain and was not disturbed. The general construction of this drain is similar to that of the main Abbey drain. The sides are made of dressed stone and the bottom paved with rectangular flags. It is two feet across, fourteen inches deep with a fall of approximately one in sixteen towards the south.

The cap-stones had been covered with "made" ground of clay and small stones and to the west of the drain, irregular large and smaller stones laid roughly to the same level, were covered with a similar filling. This may have been a floor foundation sloping rather steeply to the south. East of the drain is a filling of clay and small stones which had been banked up against the remnant of the west wall. (Fig. 27).

The filling of black earth and stone extended right down to the level of the top of the drain. This filling contained a number of large dressed stones.

Simultaneously with trench W.R. 13A another trench, W.R. 14 was opened up. This was four feet by eight feet and lay two feet six inches to the north of the north datum line with its base lying roughly between perpendiculars to that line at points one hundred and one feet and one hundred and five feet. The northern part of the trench to a breadth of five feet was later extended eastwards for a distance of twelve feet. Later still, a further extension six feet by four feet was made on the south side of the new part at a point five feet three inches from its south-east corner. This last extension crossed the datum line approximately between points ninety-one feet and ninety-five feet.

Below the turf and top soil a filling of black earth and small stones was found over the whole area. This layer reached a depth of about one foot six inches on the northern side, sloping down to about three feet in the southern arms. Below it was a filling of brown earth, stones, broken tiles, etc., to a depth varying from one foot to one foot six inches on the northern face. The filling increased in depth very sharply to the south and west, so much so that in the extreme south-west corner of the original trench the natural stratum was not reached even at a depth of five feet eight inches from the surface. In this layer was found a quantity of animal bones (for the most part of oxen), numerous fragments of pottery. and a few nails and pieces of glass. Below

it, on the north side of the original trench, made ground (clay) was found. This layer of clay, which gave the appearance of a floor, extended eighteen inches to two feet from the north face and was found later to cover the greater part of the first extension, over its whole width.

On removing the clay, a floor foundation of cobble and a few paving stones was found; this sloped down towards the south-west. About midway along the north face were two well-shaped rectangular stones each with a square depression cut in its top. These proved to be bases for door posts. Between them was a three foot long stone threshold. (Fig. 28).

Lying on the cobbles at a point about one foot from the north face and between the original trench and the first extension an iron axe-head was found in excellent preservation. It measures approximately seven and a half inches from the edge of the blade to the back of the axe and five and a half inches across the blade at its widest point. It is considered not to have been of earlier date than the sixteenth century.[8]

Immediately to the east of this doorway two walls meeting at right angles were uncovered about two feet six inches below ground level. One of these runs in a south-easterly direction and is continuous with the wall found in trench 13A; the other running south-west has been broken down five feet from the junction of the two walls. The walls are one foot six inches wide and of one course only, set on what appears to be natural clay and bonded with clay.

Further excavation in the original trench showed the southern edge of the cobbled floor revetted in one place with a flagstone placed on edge and, farther east, a layer of cobbles at a lower level which may be the remains of a lower "floor" or possibly merely a foundation for the upper layer. Further excavation in the southern part of the trench revealed a bed one foot deep of natural clay above gravel except in the extreme south-west corner where natural strata were not reached.

In the final extension trench the cobbled floor apparently continued on the west up to the line of the wall running south-west. It culminated in the south-west corner in a hollow space surrounded by stones which may have formed the socket for a post. In the south-east corner a very large stone was uncovered about three feet below ground; further excavation will be needed before it can be decided whether it is connected with an extension of the west wall. The rest of this trench contained filling of clay and small stones below the layer of brown earth and stone mentioned above.

[8] W. Mercer, Ancient Carpenters' Tools, in *Practical Education and School Crafts,* Nov. 1956, p.45, Fig. 33.

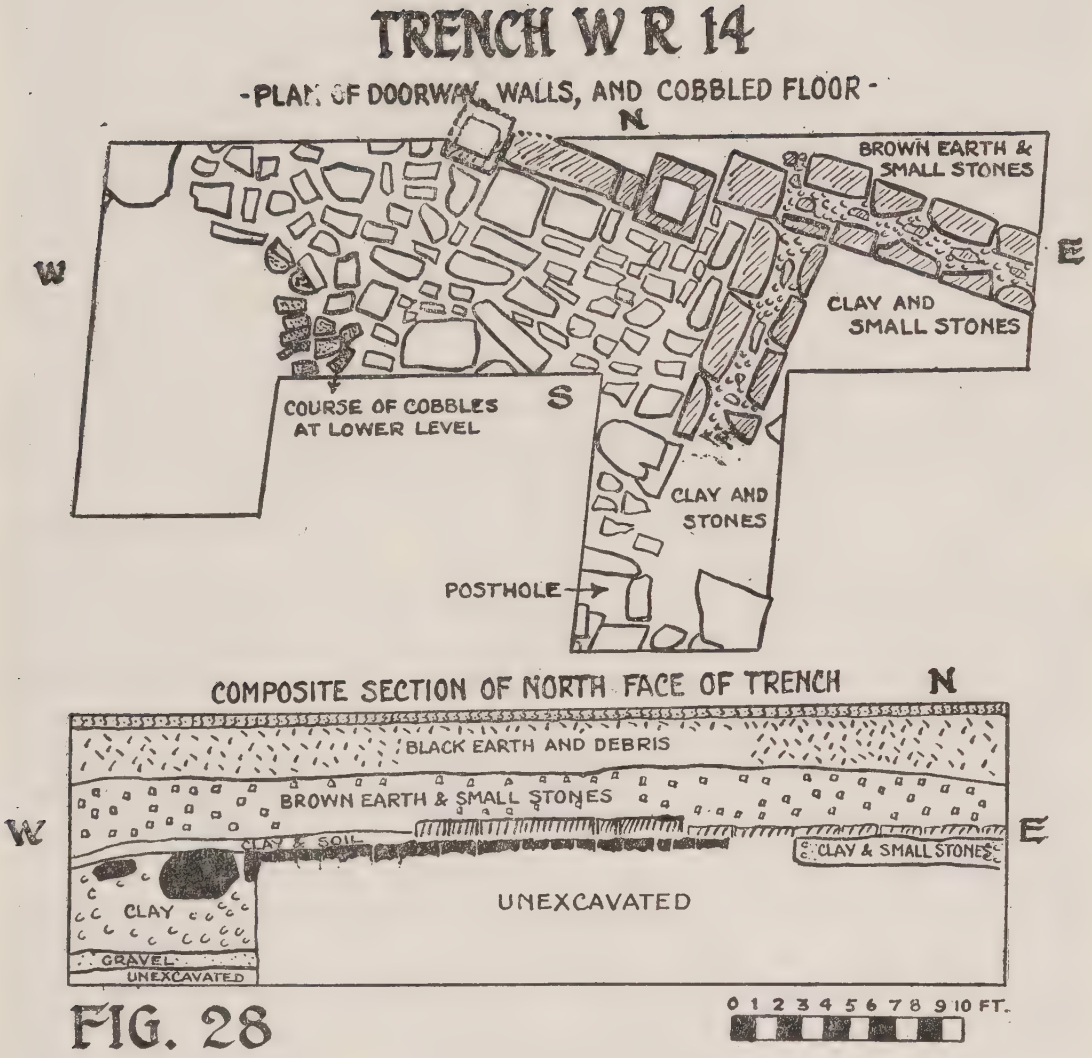


FIG. 28

WEST RANGE 14

DISCUSSION

The west wall has now been traced for a length of forty-three feet six inches from its junction with the south wall. Unfortunately there is no indication as to how far it extended eastward towards the meat-kitchen nor have there been any finds which would indicate its date. Towards the west, however, it has been followed up to the capping stones of the drain found in W.R. 13A. It was not found, however, in the arm of the trench W.R. 14; but still there is no proof as to how far it did run. It must, however, be considered in relation to the other walls and the floor found in these trenches. (Fig. 26).

It will be seen from the plan that there is an eleven-foot stretch of wall running westward from the capping stones of the newly-discovered drain some seven feet six inches from its junction with the west wall, and that there is another wall running off from the end of this at right angles towards the south for a distance of five feet after which it is broken down.

These two walls may have been part of a building bounded by the west wall and on the east by a wall which ran on top of the drain. The latter may be suggested by the two stones found on top of the drain just before the place where the capping stones are missing. If such a building existed it could not have been very substantial, as the structure of the walls shows.

The large drain also presents problems which cannot be satisfactorily solved until it has been traced for its whole length. Its fall, one in sixteen, should bring the floor on a level with the main drain of the Abbey if it goes back as far as this. If this is correct it will pose such questions as to which drain came first or whether the main drain originally turned south into the newly-found one. The two pieces of sixteenth-century pottery found in the latter would appear to indicate that it was still open at that date. Proof or disproof of this may be provided by future exploration.

The heavy cobbling and the doorway found in trench W.R. 14 adds further proof to the suggestion that there was a long curtain wall shielding off the meat kitchen and the refectory from the river, as it is not usual to build doorways without any walls alongside them. This doorway probably served as a back entrance to the kitchen and although its narrow width would limit the size of any object taken through it, the cobbling is certainly strong enough to carry very great weights and heavy vehicles. From this it may be assumed that supplies were probably brought by wagon to the doorway and then unloaded there. It could also be used for loading any débris brought from the kitchens.

All the areas under review here will have to be closely explored in the future.

THE INFIRMARY—See Fig. 29 (by C. Vincent Bellamy, B.Sc.)

As always at Kirkstall, we turn first to St. John Hope's Architectural Description of the Abbey[1] and seek his views on the dates and purposes of the various visible remains. His comments are relevant to the report which follows, so a brief summary of them is given first.

Hope informs us that this infirmary was founded in the **early thirteenth century** and it then consisted of the large hall about 83 feet long and 45 feet wide. Associated with this building is the chapel and kitchen block which stands on the east side of the Abbot's house, and probably a wooden gallery linking the two buildings.

The hall itself was divided into a nave about 31 feet wide and an aisle on the south side, about 11 feet wide. They were separated by a row of wooden posts which supported the roofs. The main hall was probably used for recreation and the beds disposed in the aisle, possibly in separate cubicles.

In the fourteenth century the hall was remodelled, the wooden partition being replaced by a stone arcade, and a second arcade on the north side provided another aisle. Each arcade is of five bays, four of them arched and the westernmost built solid. The arches are carried on octagonal pillars, the bases of which rest on raised pedestals, some of which may have carried the wooden posts of the earlier division. The east wall was rebuilt, possibly to counter the thrust of the stone vaulting, and additional fireplaces were added in the side aisles. A porch was built outside the western entrance but for some reason this was not symmetrically placed with regard to the door.

The building immediately south of the infirmary was also built in the fourteenth century, connecting the main hall with the chapel block. It may have replaced an earlier wooden structure. It was a two-storey building and is described as the Visiting Abbot's Lodging. In the absence of any sign of a staircase St. John Hope suggests a wooden stair against the western wall. The building spans the main abbey drain and, as there seems no other place available, he thinks there may have been a row of privies on the upper floor, for the use of the inmates of the infirmary.

In the **fifteenth century**, further alterations were made. In the main hall the arches of the arcades were walled up, and the side aisles converted into a two-storey series of rooms. Staircases were built on the south side of the nave and in the north aisle to give access to the upper rooms.

[1] *Architectural Description of Kirkstall Abbey,* By W. H. St. John Hope. (Thoresby Society Publications, Vol. XVI, 1907), pp. 38-43.

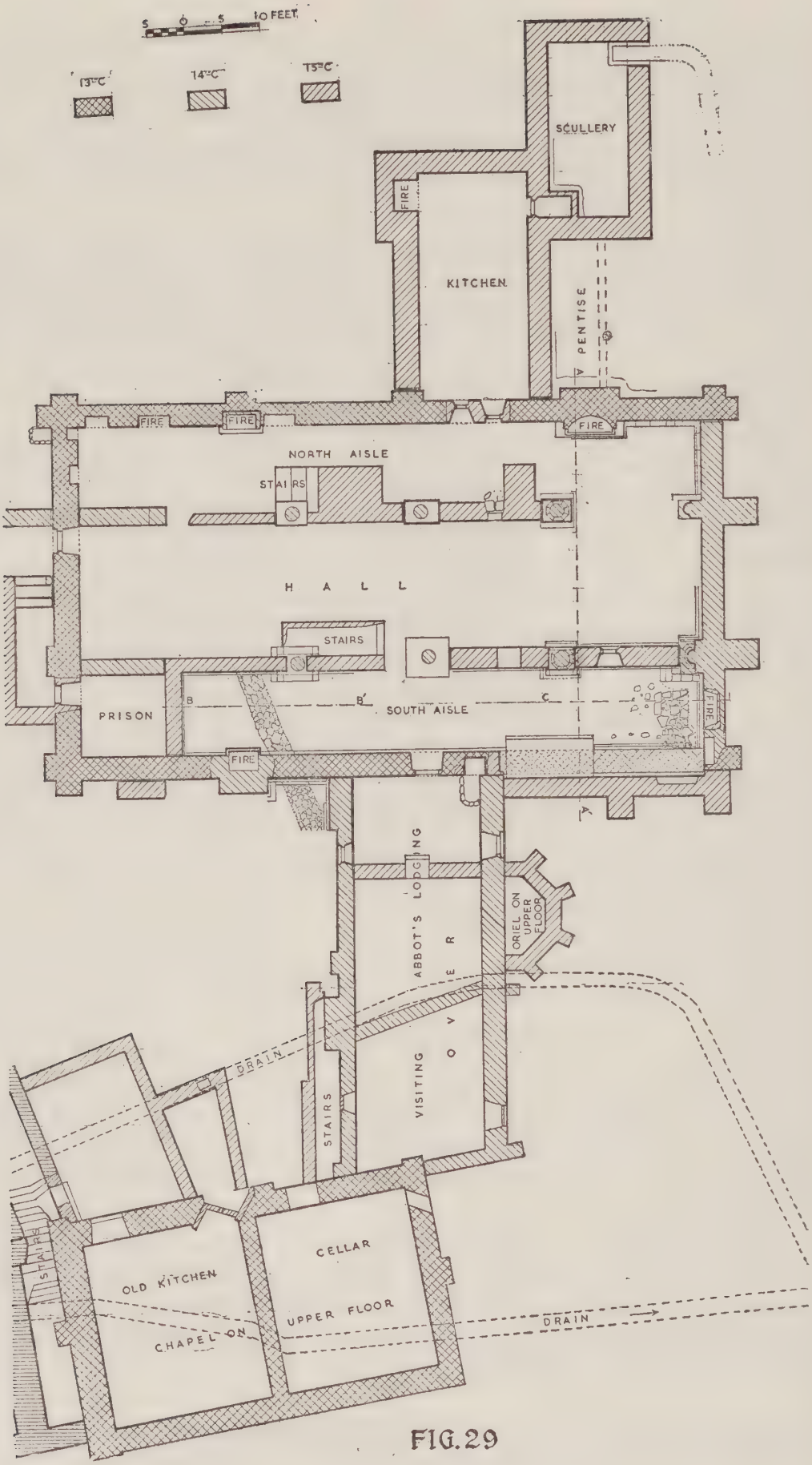


FIG. 29

PLAN OF INFIRMARY

About the same time, a new kitchen and scullery were built on the north side of the hall, with a pentise to the east of the kitchen. The wooden stair of the visiting abbot's lodging was replaced with a stone staircase.

Later in the fifteenth century, a cross wall was inserted in the northern part of the visiting abbot's lodging and a half-octagonal oriel built out to the east. In the main block, the eastern part of the south wall was taken down and rebuilt farther south. The reason for this is not apparent, although Hope does suggest that the upper room may have become a new infirmary chapel. In the south west corner of the hall the last bay was walled off to form a prison, with an independent entrance from the west and a porch over it. Running westwards from the prison porch are the foundations of what is assumed to have been a laver or conduit.

An examination of the surviving walls of the infirmary reveals that in general these show offset courses at about present ground level. In view of this, it seemed doubtful whether excavation would disclose any intact floors or sealed stratified layers. On the other hand pottery might be found in a satisfying association with the wall foundations, and there might be traces of some use of the site before the early thirteenth century.

Initially six trenches were planned to test the easternmost bays of the nave and of each aisle. Later the pentise area north of the hall was sampled, and the adjacent scullery. The adjoining kitchen is almost completely occupied by a large tree, and was not excavated.

Ultimately the available labour force was concentrated on an almost total excavation of the south aisle.

THE SCULLERY AND KITCHEN YARD

Removal of the turf in these areas showed that it rested only on 'Dissolution' rubble. A thick layer of thin broken flags contained late monastic and modern pottery, fragments of roofing tile, an occasional oyster shell and an 1899 penny. This fill rested on natural clay-with-gravel.

The walls of the kitchen show an offset course at present turf level, and this rests on a layer of small cobbles which are in turn on natural ground.

The only other feature encountered was a post-hole in the penthouse area. It was seven feet from the wall of the main infirmary building and seven and a half feet from the east wall of the kitchen. It is in line with a vertical groove cut into the buttress behind the thirteenth-century fireplace, and this presumably marks the front of the penthouse which Hope

mentions. The post may, therefore, have supported the edge of the roof of the penthouse. It was filled with cobbles and broken flags and there was nothing to indicate the dimensions of the post it had held. It lacked the flat bedding stones which were a feature of a similar support outside the main kitchen.[2] There was no sign of a second post farther north though such might have been expected if the pentise extended to the wall of the scullery.

THE NORTH AISLE—Fig. 30

Two trenches at the eastern end of the north aisle showed that the present turf rested on 'Dissolution' rubble containing Cistercian ware, a 15th-16th century jetton, modern glass and pottery and a fragment of a stem of a clay pipe. There was a liberal scatter of thin flag and one piece of mediaeval stained glass.

Below this, there was a layer of clay containing small cobbles (layer 1) which appeared to be a late monastic make-up now contaminated with modern glass and pot. This in turn rested on a silty clay, overlying glacial gravels at about two feet below present turf.

The trenches were taken low enough to expose the foundations of the adjacent walls. Both walls have an offset course at approximately present turf level with a projection of five to six inches. Another course below this is in the same vertical plane, giving an overall depth of sixteen to eighteen inches. Four more courses project a further two inches and carry the foundations down to four feet. The stones are laid in regular courses throughout and are let nearly two feet into the glacial gravels. There is no trace of mortar in the foundation levels, the stones being set in clay, but the two courses of the upper offset and all courses above are mortared. The general character of these foundations is unlike most of those seen at Kirkstall (e.g. the warming-house, refectory or main kitchen) but does resemble those of the long south wall described in the eighth report. The infirmary foundations do not, however, exhibit the rather marked batter, which was a feature of that wall.

The foundations of the east wall are bonded into those of the north wall from the upper offset down, so that the fourteenth century east wall is built on thirteenth-century foundations. The fireplace in the north wall is contemporary with it.

We have not seen the external aspect of these thirteenth-century foundations, but they do seem to imply that the first building was a substantial one.

[2] *Kirkstall Abbey Excavations,* 1950-54 (Thoresby Society Publications, vol. XLIII, 1955).

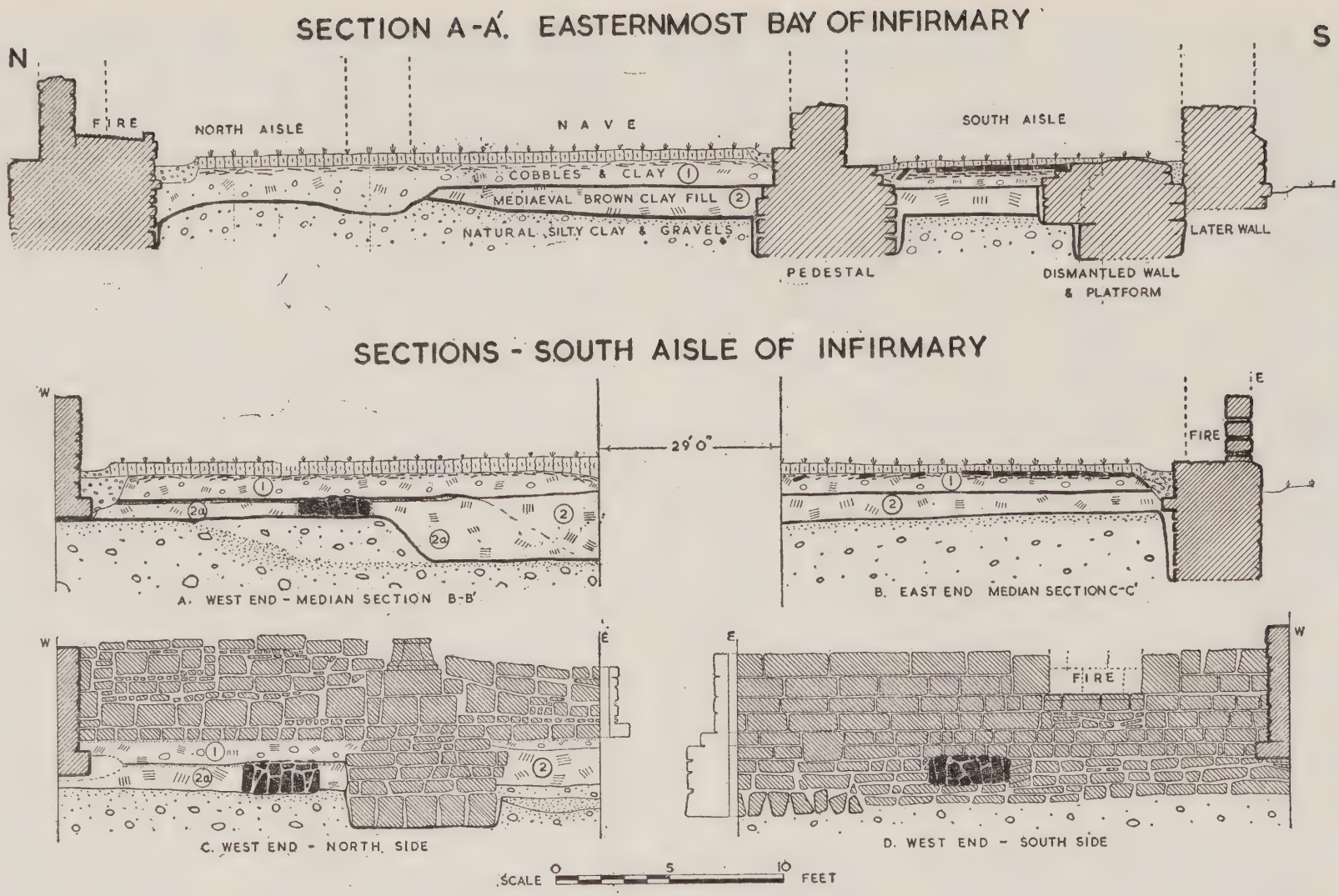

SECTION A-A'. EASTERNMOST BAY OF INFIRMARY
N
S
FIRE
NORTH AISLE
NAVE
SOUTH AISLE
COBBLES & CLAY (1)
MEDIAEVAL BROWN CLAY FILL (2)
NATURAL SILTY CLAY & GRAVELS
LATER WALL
PEDESTAL
DISMANTLED WALL & PLATFORM
SECTIONS - SOUTH AISLE OF INFIRMARY
W
E
29'0"
FIRE
A. WEST END - MEDIAN SECTION B-B'
B. EAST END MEDIAN SECTION C-C'
C. WEST END - NORTH SIDE
D. WEST END - SOUTH SIDE
SCALE 0 5 10 FEET

FIG. 30

The north aisle trenches also exposed the footings of the respond pier of the northern arcade. They show that this is associated with the fourteenth-century alterations, and had no counterpart in the earlier building.

THE NAVE—Fig. 30

Excavation of the main hall, or nave, was restricted to one trench in the south-east corner, and two narrow trenches across the western end of the first bay.

The former was designed primarily to expose the foundations of the respond pier of the southern arcade, and to examine their relationship to the original east wall.

The footings of the east wall were essentially the same as in the north aisle, with two offset levels and regular courses into the natural gravels. The respond pier was found to be built on similar foundations, and they were bonded into the main wall at the thirteenth-century level. The lowest course was of fairly large square-ish stones rather widely spaced. A piece of rim was found securely positioned amongst the foundations under the pier, at a depth of two feet four inches below the top offset level. It was embedded in the brown clay between the stones. (See page 125).

This trench also disclosed that, at least in this locality, a twelve inch deep layer of charcoal-flecked brown clay separated the upper cobble-clay (layer 1) from the natural clay and gravels below. This brown clay (layer 2) contained a few sherds of pottery which might reasonably be considered early thirteenth-century in date. When this layer was traced out to the footings of the wall, it was seen to be continuous with that occurring in the foundations. At the glacial gravel level the wall foundations are set into a construction trench and the limits of this are clearly discernible. There is no sign of a construction trench in the brown clay, and the deposition of that clay must be contemporary with the first building.

As there had been no sign of this layer 2 in the north aisle, two narrow trenches were sited across the western end of the first bay, to span the full width of the nave. These again exposed the brown clay fill, with the same pottery content. Near the south arcade it was about twelve inches thick, but thinned out as it was followed northwards, owing to the rising level of the underlying clay and gravels when the upper surface of the brown clay remained horizontal. Fill 2 disappears completely on the line of the northern arcade. It clearly represents mediaeval tipping to level ground which had a natural fall to the south. Fill 1 in these trenches again contained late monastic pottery contaminated with post-monastic material.

THE SOUTH AISLE—Fig. 30

The present turf level in the south aisle is about nine inches lower than that in the nave, but it does conceal the remains of the section of the south wall which was rebuilt farther south in the late fifteenth century (see page 115). Turf was removed from the easternmost bay, leaving only a median baulk on the east-west axis. The northern of these two trenches revealed a sequence of fills which is now familiar, but these were sealed by a fairly intact **flag floor** just below the turf. It was of irregularly shaped sandstone flags, one and a half to two inches thick, and undisturbed in the eastern half of the trench, except where it had been cut, probably by St. John Hope, at the angle of the walls. The flags rested on a packing layer of thin broken pieces of flag which in turn was carried by the cobble-clay layer 1. In the western half of the trench the surface flags were missing but the packing layer survived. On the northern side, the trench was limited by the wall built in the fifteenth century to close the arches of the arcade. This wall rests on a mortar layer on top of fill 1 and apparently limited the flag floor on this side. Hope's trenches have destroyed the flag floor near the face of the wall, but there is no sign of flags under the wall itself.

Layer 1 is here seen for the first time effectively sealed. From the sealed part it yielded assorted pottery, including Cistercian ware, and cannot be earlier than the late fifteenth century. The layer is about nine inches thick.

Under the cobble-clay fill, the brown clay of layer 2 is about one foot thick and produced a satisfying collection of pottery, none of which appears to be necessarily later than the early thirteenth century. A later trench in the next bay produced a coin of King John (1199-1216) in this same fill, and the date of the layer seems firmly established.

Under the brown clay, there is a two to three-inch layer of compact white-ish clay resting on glacial gravels. These layers were sterile and are the only layers cut by the foundation trench of the east wall.

The southern trench of this pair exposed more of the flag floor and also revealed the remains of the dismantled portion of the south wall. The flag floor was limited on its south side by the early wall and had never continued over it (see Fig. 30). The flags rested on the upper of two offset levels and parts of the surviving wall core are higher than the flags. We could find no evidence of any later floor, though such may have been destroyed when the lawns were made. The position of the fireplace in the east wall makes it doubtful if there ever was one.

The footings of the **dismantled wall** are bonded into those of the east wall. Both show two offset levels, though the upper

one is one course lower than it was in the nave and north aisle. The bottom course of the south wall consists of stones which are placed vertically and widely spaced. Some of them are almost wedge-shaped, with the narrow edge at the bottom, and it would appear that deliberate provision was being made for land drainage.

The fifteenth-century wall to the south is built right up against the footings of the earlier one and may in part rest on them. Above the offset level the space between the walls is filled with mortared rubble. A small trench on the south side of the late wall showed that this wall has no footings of its own. An offset course is visible at about present turf level, and there is only one course of stone below that. There is no offset course on the north face of this wall.

St. John Hope, on his plan of the Abbey, shows a rectangular outline over the western part of the dismantled wall. He makes no reference to it in the text and it is not annotated or coloured on the plan.

Excavation reveals it as a **large platform** built into the early wall footings and projecting eighteen inches farther north. It is twelve feet long by five feet wide and has offset on its northern face. There are no offsets on the east and west faces. The foundations go down sixteen inches below the level of the flag floor — about six inches less than the foundations of the main wall. We did not remove any of the platform, but there is little doubt that it is later than the originial wall. It has a construction trench in the brown clay layer 2.

The excavation gave no clue to the purpose of this platform, and the small trench outside the later wall did not reveal anything that could be associated with it. A post-hole close against the face of the later wall contained a sherd of late pottery and the surrounding clay contained a jetton of 15th-16th century date, more late monastic sherds, and a spatula (page 125). The late fill rested on natural ground.

More trenches were now opened to complete the excavation of the south aisle, leaving an east/west baulk down the centre, and north/south baulks at ten feet intervals.

Throughout these trenches a variable concentration of thin broken flags occurred immediately below the turf. This was clearly the make-up for the late fifteenth-century flag floor, somewhat disturbed by St. John Hope near the walls, and probably redistributed when the lawns were laid. Below the flags, fills 1 and 2 again occurred, but were not so clearly separated as at the eastern end and it was difficult to draw a sharp line of demarcation. Even so, the upper part of the double fill was of cobbles and clay with late monastic pottery,

and the lower part was brown clay with some early thirteenth-century pottery. Between, the content was mixed cobble-clay and brown clay, with sundry nails, pieces of floor-tile and roof-tile, fragments of white plaster with traces of a dark chocolate-coloured design, and assorted pottery of thirteenth, fourteenth and fifteenth-century dates. It would seem that the later alterations involved more disturbance of the early thirteenth-century fill in this area, than had been the case at the eastern end. This was particularly marked opposite the end of the visiting abbot's lodging.

The foundations of the original south wall, with its unusual bottom course, had been noted further east. Trenches towards the western end of the south aisle revealed a bottom course which consisted of stones bedded horizontally, and in the same character as the higher courses. If the need for drainage required the open vertical coursing at the east, it apparently did not arise towards the western end of the aisle. Further excavation showed that the character of this bottom course changed abruptly at a point opposite the butting joint of the western wall of the visiting abbot's lodging. There was nothing to suggest that the two sections of the foundations were other than contemporary. Examination of the various section drawings suggests that the natural slope of the ground, before fill 2 was added, would tend to direct surface drainage across this part of the land.

The south aisle trenches also gave an opportunity of inspecting the foundations of the **pedestals** on which the octagonal pillars were placed. These proved to be very substantial, each extending fully six feet from east to west, and probably the same from north to south. They are four feet deep below the offset and do not show any construction trenches into fill 2.

They have the same characteristics as the foundations of the outside walls, and it would appear that the pedestals are contemporary with the original building, but they seem too massive to have been intended only for timber posts.

The prison occupies the westernmost bay of the south aisle, and was not excavated. Trenches were dug on the east side of the dividing wall, however. They show that the dividing wall is later than the south wall, and that it has the same construction as the fifteenth-century walls which close the arches of the arcade. It rests on brown clay and is of late fifteenth-century date. Its foundations are only one foot deeper than the wall to its north, and St. John Hope's suggestion of the "formation of a prison . . . by walling off the last bay and lowering the floor" and "entrance to it . . . with descending steps . . ." must be interpreted cautiously.

The trenches adjacent to the prison wall revealed other features of interest.

The cobble-clay fill 1 was much the same as elsewhere, but it was separated from the brown clay below by a definite layer of mortar which was consistent throughout this bay. Beneath the mortar a foot-thick bed of brown clay seemed to be the same as that of fill 2, except that it contained no pottery. There was a marked layer of charcoal between the clay and the mortar in an area near the later fireplace, and the clay itself was flecked with charcoal throughout the fill.

Westwards, this brown clay fill passes underneath the prison wall; northwards it passes under the wall closing the arch; southwards it is cut by the foundations of the south wall, and eastwards it is limited by foundations of an **oblique wall** which crosses the fourth bay (see fig. 29), reappears east of these foundations, then merges into the cobble clay fill as already described. The mortar layer extends over the brown clay to these limits, it was cut when the prison wall was built, and it passes over the remains of the oblique wall. It is later than the foundations of the adjacent pedestal. The absence of any pottery in the brown clay makes it difficult to date it accurately. It would appear to be earlier than fill 2, because the main wall of the infirmary is cut into it. It is not earlier than the oblique wall because this has no construction trench, and it was probably laid at the same time as the oblique wall foundations. It was designated fill 2a. (Fig. 30).

The foundations of the oblique wall are quite shallow, resting on gravels but not let into them, and the gravels themselves are one foot higher than they were further east. The base of the wall was probably about two and a half feet wide and the footings consist of irregular boulders of various sizes up to about 18in. x 12in. x 9in. They are bedded with silty clay and have a firm row of edging stones on each side.

Northwards the foundations pass under the fifteenth-century wall and are separated from the base of that wall by the cobble clay layer 1. They must be sought inside the nave in future excavations.

Southwards they are cut by the building of the main south wall of the infirmary. They were found again outside the thirteenth-century wall, and are again cut by the west wall of the visiting abbot's lodging. There was not time to look for them inside the lodging.

Two sherds of pottery were recovered from amongst the cobbles of the oblique wall foundations. One piece was found in the infirmary aisle, and the other piece in the angle between the infirmary and the lodging. They appear to be from the same vessel and could be of late twelfth-century date.

It would appear that the oblique wall must relate to some structure which ante-dates the early thirteenth-century infirmary,

though it is unlikely to be earlier than late twelfth century in date. The nature and extent of this building will be determined in future excavations.

Although this early wall is found running at an oblique angle to the later infirmary, it is, in fact, almost parallel to the walls of the main dorter range.

DISCUSSION

In general, excavation has supported St. John Hope on almost all points with regard to the sequences and the approximate dates of the various alterations. The only modification of his views may be on the character of the first building. Excavation suggests that the building was a substantial one from the beginning, and the foundations seem too elaborate for a half-timbered structure. It also seems likely that the original division of the block into hall and aisle involved stone pillars rather than wooden ones.

The season's work has, however, contributed some additional information, including traces of an earlier building in this locality. It would now appear, that with the completion of the main ranges of the abbey, the monks were left with only limited usable land to the eastern side of the dorter range. In the late twelfth or early thirteenth century some structure was erected to the east of the sub-dorter occupying ground which later supports the western side of the infirmary. The oblique wall uncovered this year would seem to be the eastern wall of this early building, and there is some evidence that the natural gravels were banked up to carry this. The foundations of the building were laid and charcoal-contaminated clay used to cover the gravels inside the wall. The raised ground extended two to three feet east of the wall, then sloped down to the lower level. The building itself may well have been a half-timbered structure.

At a slightly later date the building of the present infirmary was started, the earlier building being presumably demolished at the same time. At its south-western corner the new building extends on to the ground already made up, and the foundations of the south wall are in a trench cut into the brown clay. Further east the ground was lower, and probably wet. The foundations for the new wall are therefore built into the gravels, leaving an open course of stone at the bottom for drainage. The general ground level was then raised by tipping more clay as the walls were erected. The foundations for the pillars of the south arcade were probably laid at the same time.

The clay filling contained a coin of John (1199-1216) in a fairly worn condition, and cannot be earlier than the losing of that coin. St. John Hope regards the main block of the infirmary as contemporary with the chapel block on the east side of the

abbot's house. Elsewhere he says that the chapel block is earlier than the abbot's house, and he dates the latter as c. 1230. The date of the building of the main block,and of the deposition of the clay filling, would, therefore, seem to be late in the first quarter of the century.

Three other questions remain open. They concern the eastern end of the south aisle; in particular, the dismantled thirteenth-century wall, the platform and the late fifteenth-century wall.

The **platform** appears to be somewhat later than the original south wall, and its size rather suggests the foundations for an intra-mural stair. St. John Hope does not contemplate a second floor over the aisle until the fifteenth century, and he shows a stair on the south side of the main hall to give access to this. On the other hand, he does suggest that the visiting abbot's lodging was built as a two-storey building in the fourteenth century, probably replacing an earlier structure. He can find no stair to the upper floor of this building until the fifteenth century, but believed that the upper floor contained privies for the use of the infirmary inmates. It seems possible that a stair in the south aisle of the infirmary may have provided access to these privies.

The date of the demolition of the thirteenth-century wall is uncertain. It would appear to have been standing when the flag floor was laid in the late fifteenth century, because the flags only run up to the wall, not over it, but we have not yet seen any sign of a later floor. It was presumably demolished when the new wall was built, because the new wall has a window at ground floor level. Further excavation on the outside of the new wall may yield dating evidence for its construction, but in the meantime it appears that it was built after the laying of the flag floor, unless the stump of the early wall was left as a step above floor level.

The reason for this rebuilding is still obscure. The new wall does add about five feet to the width of the aisle, giving a total width of fourteen feet six inches for the upper room, but the gain hardly seems worth the labour involved. If the platform did carry a staircase, this may have been retained to serve the new chapel. It would not obstruct the window in the new wall, and this may explain why the buttress of the new wall is east of centre.

SMALL FINDS

COINS

Half of a Silver short-cross penny—Class V.
John (1199-1216) Obv. HEN . . . EX Rev. LLEM . . . ON
found in brown clay fill 2—south aisle of the infirmary.
(page 119).

THREE JETTONS

From fill 1 levels in the infirmary. 14th-15th century.

EAR PROBE (?)

Made of Bronze. Length 2½ inches. One end is spoonshaped, the other forked. At the forked end there is a handle made of thin wire mesh held in position by turns of wire. A small ring is fastened to one of these. Found outside the rebuilt wall—south-east corner of the infirmary.

THE POTTERY (by H. E. Jean Le Patourel, B.A.)

A substantial amount of pottery was found in both the areas that were excavated this year. To the south of the meat kitchen there was little stratification save in the neighbourhood of the drain (see page 102 above), where a sequence of potsherds was of some help in determining the probable course of events. In the infirmary, however, it was possible to link up several groups of pottery with building periods, with very useful results.

THE INFIRMARY

The main interest here centres on the group of sherds found in the south-east corner of the building (see page 119 above), where level (2) was judged to be contemporary with the erection of the first walls of the present building, on the pieces found in association with the wall running beneath the present building, and on the few pieces which were sealed beneath the fifteenth-century walls. At first sight this appeared to give three distinct groups for consideration; but a careful comparison of the two sherds found among the cobbles of the earliest wall and analagous material from elsewhere in the Abbey, with the pottery found in layer (2), suggests that the vessels from which these two sherds come are likely to be contemporary with the layer (2) material. This is not intrinsically unlikely since the earlier wall may not have been razed until the site was needed for the present infirmary. None of the characteristic twelfth-century ware was found in the infirmary, and these two sherds, though they are gritty in texture and well fired, differ from twelfth-century pottery in their comparatively thick walls and the presence of a very much decomposed green glaze. They are themselves too shapeless for illustration, but closely comparable pottery from other parts of the Abbey are shown (fig. 31, nos. 1 and 2).

The material judged to be contemporary with the building period of the infirmary (layer 2 in the south-west corner and the material from the earliest wall) comprised one sherd in a

fine even-textured, slightly sandy fabric with a mottled glaze (no. 8); two sherds in a very harsh, heavily gritted ware, which has been found in previous years, but to which it has never been possible to assign even an approximate date; and a considerable number of pieces of the familiar Kirkstall gritted ware, glazed in green and light or dark brown. This gritted ware might be further differentiated into hard and soft ware, though this difference could be merely an accident of firing.

Perhaps the most surprising feature of this pottery is the presence among it of several sherds glazed in dark brown, one of which (fig. 31 no. 8) is of a quality comparable with that found in fifteenth-century contexts in earlier years. It is evident that this glaze can no longer be regarded as evidence for a late date as had been suggested in previous reports. It is likely that the coarse pottery found in association with Cistercian ware on a kiln site[1] this year may help to distinguish late brown glaze and the type associated with the first infirmary building period.

The single sherd in fine-textured fabric with the mottled glaze (no. 8) is of a type relatively uncommon at the Abbey and may have come from a distance; fabric and glaze are matched very closely by a tubular-spouted pitcher found in 1956 (**Kirkstall Abbey Excavations**, 7th Report 1956, page 39 no. 3). Such pitchers are usually dated to the end of the thirteenth or beginning of the fourteenth centuries, but the fabric may well have been in earlier use. Kirkstall gritty ware, of which most of the fragments in this group are made, has always been difficult to date, since it continued in use over so long a period. This layer shows both hard and soft forms, green (coloured with copper) and dark brown (coloured with iron)[2] glaze, to have been in use in the thirteenth century. Jug no. 4, in hard gritty ware was covered with a good quality dark brown glaze of a kind that had been previously supposed to date from the fifteenth century. Part of a jug (no. 3) in softer gritty ware has an unusual dark brown glaze with a rough "bitty" surface. The striking resemblance between this jug and the ware and glaze of a number of double dishes found in previous years suggests that these latter are of much earlier date than had been supposed.

St. John Hope, writing some sixty years ago, did not state the evidence for the early thirteenth-century date which he assigned to the infirmary, and much of that evidence is now destroyed. This pottery must be regarded as contemporary with

[1] I am grateful to Mr. Woodrow, of Silcoates School, Wakefield, for information about the group of kilns found in the school grounds.

[2] Dr. J. E. Hemingway of Leeds University kindly gave a spectographic analysis of these brown sherds which showed a greater iron content in the glaze than in the base material.

the building; and even if it is ascribed, somewhat more generally, to the thirteenth century, it still gives valuable information and corrects previous misconceptions.

In the south-east corner of the infirmary layer (1) was covered by a mortar layer on which rested fifteenth century walling (see page 119 above). The pottery from this level forms the third group to be considered. Unfortunately, as so frequently happens, it proved to be a collection of small sherds of mixed date. These did, however, include part of a plain Cistercian-ware cup with a small piece of the characteristic thin rim, moulded to seat a lid. Its presence at this level is yet another indication of the fifteenth-century origin of this pottery. It may be remembered that part of such a pot was found under a floor believed to be contemporary with the meat kitchen (**Kirkstall Abbey Excavations**, 3rd Report, 1952, page 37). At Pontefract Priory also, Cistercian ware, both plain and decorated, has been found in a late fifteenth-century context.

Among finds not directly related to any structure were part of a rectangular moulded dish, the first of its kind to be found at Kirkstall, and two small pieces of late thirteenth-century French polychrome ware. These pieces belong to a different jug from that illustrated last year, though it would have been of the same general type. This is the third French import to have been found at the Abbey.

SOUTH OF THE REFECTORY AND MEAT-KITCHEN

This area produced, as it has done in previous years, pottery mainly of fifteenth and sixteenth century date. This included a number of jug fragments, of which no. 19 is a typical example, several pieces of Cistercian ware and the central portion of a lobed cup (see **Kirkstall Abbey Excavations**, 4th Report 1953, fig. 18, no. 7).

Beneath the flagging of the drain (see page 102 above), were several pieces from typical twelfth-century cooking pots. With these was a lateral handle (no. 13) from a pan, or pipkin, in very similar fabric, with a splash of clear glaze on its upper surface. This type of handle was certainly in use in the thirteenth century. There seems no reason to doubt that this example is contemporary with the cooking pot sherds with which it was found. Nos. 14 and 17 from level 3 of the same area match up in ware and glaze with the pottery from the building period in the infirmary, and may therefore be tentatively assigned to the thirteenth century. Any dating by this sort of analogy must, however, be viewed with great caution unless the resemblance is very close in all particulars, since all the evidence tends to show that there was very little development or change

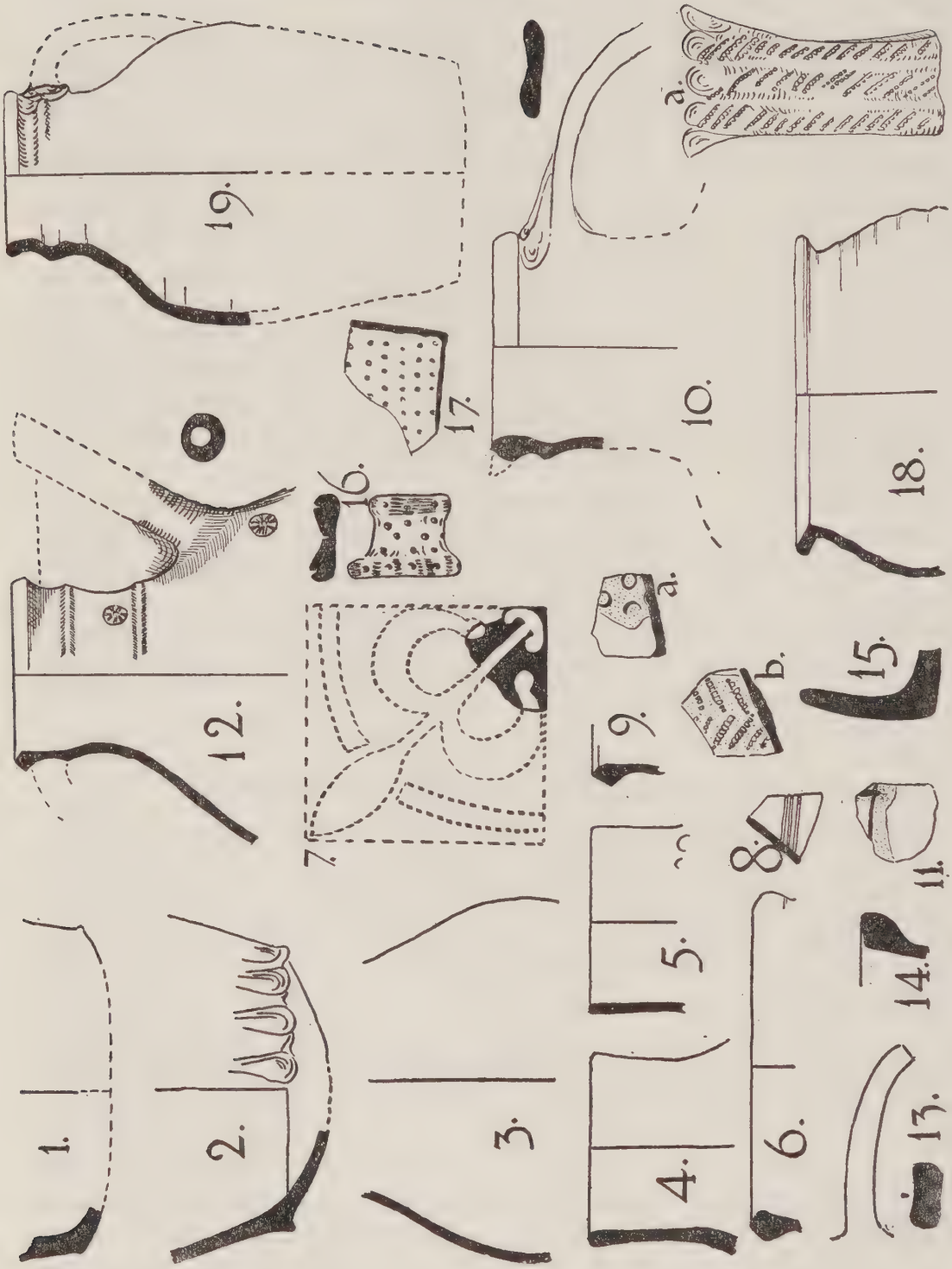


FIG 31. THE POTTERY

in the general run of Kirkstall pottery between the beginning of the thirteenth and the middle of the fifteenth centuries. Ware and glaze alone, therefore, may be misleading. Above level 3 the finds consisted of fifteenth and sixteenth-century material only.

DESCRIPTION (FIG. 31)

1 and 2. Two bases; gritty ware, grey core with red surfaces and decayed, greenish glaze. Similar to body sherds found among the cobbles of the wall running beneath the present infirmary.

3. Part of a jug in rather soft, gritty, pink ware; external surface grey, with the upper part covered with dark brown glaze presenting a rough and "bitty" surface.

4. Rim of a jug in very hard, gritty ware, with good dark brown glaze. Grey core, red internal surface.

5. Hard gritty rim, red ware. Two spots of applied cream clay appear near the break. Partial brownish-green glaze.

7. Reconstruction of a tile fragment from a pattern found in the Refectory. Dark brown base, very shallow cream inlay.

8. Fragment from a jug. Fine, slightly sandy, buff ware with horizontal incised bands. Mottled dark and light green glaze.

9 and 9a and b. Rim and two body sherds in slightly gritty pink ware. There are areas of light cream slip over which the pattern has been stamped. The neck shows signs of similar treatment and has a little highly decomposed glaze, probably light brown.

10 and 10a. Rim, neck and handle in ware similar to 9. The handle has a strip of cream slip down the centre and there is an indication of similar treatment on the body. Light brown glaze.

11. Fragment from near the base of a French jug made in the region of Bordeaux in south-west France. Fine, smooth pinkish ware with light cream surface. The stippled area is apple green, and the lines are painted in dark brown. A complete jug of this type was illustrated last year.

12. Part of a tubular-spouted pitcher, Sandy ware, grey core, buff surfaces. Brownish green glaze with streaks of darker brown. Decorated with applied

dark brown pellets stamped with rosettes. A late thirteenth to early fourteenth-century northern type.[3]

13. Horizontal handle in gritty, buff twelfth-century ware, with one spot of clear glaze. The end appears to have been filed away after firing.

14. Upper part of a bowl. Ware and glaze are similar to those from early wall in the infirmary.

15. Part of a rectangular moulded dish. Hard gritty ware; grey core and red surfaces; greenish-brown glaze. The first example of a moulded dish found at Kirkstall.

16. Part of a handle in sandy ware, grey core and outer surface, buff inner surfaces. The handle is unglazed and decorated by combing and stabbing. The stabbing is very deep and served to allow the escape of air while the pot was fired as well as for ornament. The stabbing of handles for this dual purpose continued occasionally until at least the fifteenth century. This fragment probably dates to the thirteenth century.

17. Gritty grey ware. Surface reddish-brown with partial green glaze. Continuous stabbing over all fragments found.

18. Bowl in very hard gritty ware with dark brown glaze over rim and splashed on the body.

19. Typical late jug in hard smooth grey ware with good dark brown glaze. Remains of about a dozen of these were found in the area to the south and west of the meat-kitchen.

REPORT ON THE ANIMAL REMAINS, 1959

by Michael L. Ryder, Ph.D., M.Sc., M.I.Biol.

The digging carried out this year was apparently well away from the large dump encountered during the last three years, and there were only incidental finds of bone. Apart from a few bones from ox, pig and sheep, which were of the same character as those found in the dump, the following finds were made:—

Hare: g7/1 radius; g11/1 pelvis.

Domestic Fowl: g9/1 furcula (wish-bone); carpo-metacarpus 40 mm long; g10/1 and g11/1 humeri, one 60 mm long; WR 14/2 radius; I 2/1 tarso-metatarsus.

[3] For distribution map of tubular-spouted pitchers see *Cumb. and West. Antiq. and Arch. Soc. Trans.*, New Series, vol. LV, p. 78.

Goose: g10/1 phalanx; g12/2 radius.

Jackdaw: g15/1 Tibia.

Man: g9/1 Upper right canine tooth.

In the plus level of trench Infirmary 6 were some bones that are listed below although they may be post-monastic.

Pig: Radius measuring 147 mm from the proximal end to the suture of the distal epiphysis which was missing.

Horse: Small molar 25 mm long by 11 mm wide with reserve crown 55 mm high i.e. from an animal about 10 years old.

Domestic Fowl: Coracoid; furcula; humerus; ulna and radii 77 and 89 mm long; 2 tarso-metatarsi with spurs.

TABLE

Comparison of Fowl tarso-metatarsal bones

	length of bone	length of spur (mm)
Kirkstall	98	18
	102	18
Pontefract[1]	90	10
Modern	90	—
Early Christian Ireland[2]	104	—
Early Medieval England[2]	58, 78, 90	—

DISCUSSION

Margaret Jope discusses the possibility that some of the tarso-metatarsal bones listed in the Table are large enough to have come from fighting cocks. The large size of the Kirkstall bones suggests the same possibility, but as these were from the plus level, no conclusions about their association with the abbey can be drawn.

Whereas the proportion of ox bones at Kirkstall was about 90 per cent (see 1957 Report), it was 60 per cent in Petergate, York, and only 30 per cent at Pontefract Priory and the deserted village of Wharram Percy.[3] I have recently found a reference which might explain why Kirkstall had such a high proportion

[1] M. L. Ryder, Report on animal remains, *Yorks. Arch. Jnl. (forthcoming).*

[2] E. M. Jope in *Ulster J. Arch.*, vol. 18 (1955) p. 77.

[3] M. L. Ryder *"The animal remains from four medieval sites in Yorkshire.* British Association, York, 1959.

of ox bones. This was a reference by Trow-Smith[4] to Savine[5] who stated that at the Dissolution, Fountains Abbey had 2,356 horned cattle, but only 1,326 sheep. It is more usual to keep more sheep than cattle, and Trow-Smith thinks that Fountains must have been in a big way of business as breeders of beef and dairy cattle. Could it be that Kirkstall, too, was in a similar position?

4 R. Trow-Smith, *A History of Animal Husbandry in Britain to 1700* (1957), p. 221.

5 A. Savine, *English Monasteries on the eve of the Dissolution* (1909) pp. 193-7.

FIG 32

EAR-PROBE (?) FROM INFIRMARY

PLATE XV

SOUTH AISLE OF INFIRMARY WITH FOUNDATIONS OF EARLIER WALL

PLATE XVI

INFIRMARY—EASTERN END OF SOUTH AISLE SHOWING FLAG FLOOR AND DISMANTLED WALL

Index

* indicates that there is more than one mention.